

ASSEMBLY, OPERATING INSTRUCTIONS AND PARTS LIST FOR CRAFTSMAN 12 INCH RADIAL SAW



MODEL NUMBER 113.29501

The Model Number will be found on a plate attached to your saw, at the left side of the base. *Always* mention the Model Number in all correspondence regarding the CRAFTSMAN RADIAL SAW or when ordering repair parts.

Carefully read the instructions provided, observe the simple safety precautions and you will have many hours of satisfactory use from your new Craftsman tool.

HOW TO ORDER REPAIR PARTS

All parts listed herein may be ordered through SEARS, ROEBUCK AND CO. or SIMPSONS-SEARSLIMITED. When ordering parts by mail from the catalog order house which serves the territory in which *you* live, selling prices will be furnished on request or parts *will* be shipped at prevailing prices and you will be billed accordingly.

WHEN ORDERING REPAIR PARTS, ALWAYS GIVE THE FOLLOWING INFORMATION AS SHOWN IN THIS LIST:

- | | |
|--------------------|----------------------------------|
| 1. The PART NUMBER | 3. The MODEL NUMBER 113.29501 |
| 2. The PART NAME | 4. The NAME of item — RADIAL SAW |

COAST TO COAST NATION-WIDE SERVICE FROM SEARS FOR YOUR CRAFTSMAN RADIAL SAW



SEARS, ROEBUCK AND CO. **and** SIMPSONS-SEARSLIMITED in Canada back up your investment with quick, expert mechanical service and genuine CRAFTSMAN replacement parts.

If and when you need repairs or service, **call** on us to protect your investment in this fine piece of equipment.

SEARS, ROEBUCK AND CO.-U.S.A.
IN CANADA, SIMPSONS-SEARSLIMITED



POWER TOOL SAFETY...AND YOU

3 MINUTES of required reading for the home Craftsman... whether this is your first purchase or you're an old hand at power tools.

YOU'VE JUST BOUGHT A QUALITY SEARS TOOL, designed to give you many years of top performance and trouble-free operation. It's also designed with'

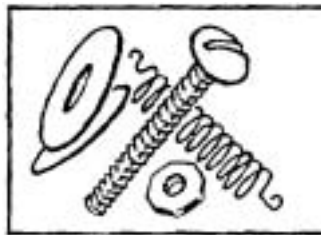
safety in mind, permitting you to use the tool without concern so long as certain basic rules are observed.

We'd like to call particular attention to some of the more important rules to follow for maximum enjoyment of your Sears power tools.



1. READ THE INSTRUCTION MANUAL...

completely • accurately. Pay special attention to safety precautions and use of safety features.



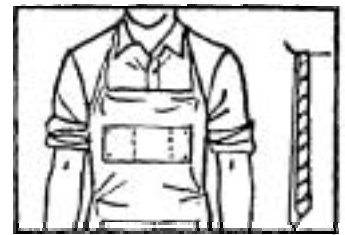
2. INSPECT THE POWER TOOL THOROUGHLY

Set up the machine according to instructions. Make certain all parts are included.



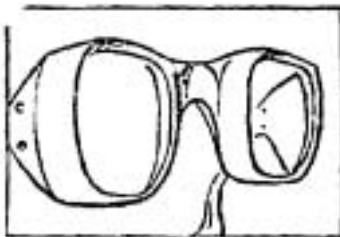
3. FOLLOW OPERATING INSTRUCTIONS CAREFULLY

They have been developed to insure correct procedure and prevent accidents.



4. DRESS PROPERLY FOR THE WORKSHOP

Get rid of loose clothing, roll up sleeves (or fasten securely), remove your tie, wear a snug-fitting shop apron.

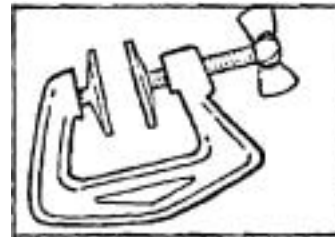


5. WEAR SAFETY GLASSES

Safety glasses or eye shields are recommended for all power tool operations.

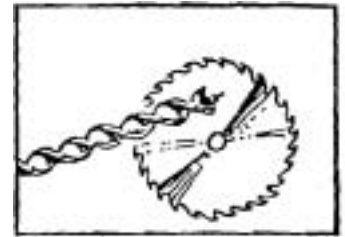
6. USE PROPER ELECTRICAL CONNECTIONS

Make certain proper voltage (110 or 220) is used. USE A GROUND WIRE; AND A SUITABLE PLUG. IF REQUIRED. Check fusing requirements of the tool as outlined in the instruction manual.



7. DOUBLE-CHECK HOLDING FIXTURES

Lock all clamps tightly. Spin parts by hand to check against misalignment or looseness before turning on tool.



8. KEEP CUTTING TOOLS SHARP

Make certain blades, drills, cutters, etc., are in top shape. Dull tools can cause rough cuts, excessive chipping... and accidents.



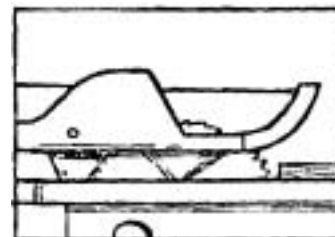
9. DON'T EXCEED THE LIMITS OF THE POWER TOOL

Abusing the power tool by doing work beyond its capacity reduces its life and increases the chance of injury to the operator. Watch especially the sizes of the work and feed rate.



10. KEEP SPECTATORS AWAY

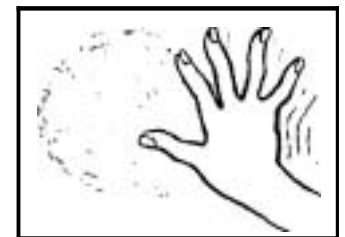
Curiosity and interest on the part of the family is fine, but avoid inspections when the power tool is running.



11. SAFETY GUARDS

Accessory safety guards are available for most tools. Use of these guards is highly recommended.

Keep protective caps on ends of exposed, rotating shafts.



12. AVOID AWKWARD HAND POSITIONS

Do not place hands in a position where a sudden slip could cause them to move into a cutting tool. Do not force work abnormally into any cutting tool.

THINK SAFETY

Carefully plan each operation before turning on tool

ASSEMBLING AND ADJUSTING YOUR SAW

POWER SUPPLY & MOTOR CONNECTIONS

MOTOR SPECIFICATIONS

The AC motor used in this saw is a capacitor start, non-reversible type, with the following specifications:

| | | |
|---|-------|-----------|
| Horsepower | | 3 |
| Voltage | | 120/240 |
| Amperes | | 13/6.5 |
| Cycles | | 60 |
| Phase | | Single |
| RPM | | 3450 |
| Rotation (viewed from saw blade end) | | Clockwise |

CAUTION: The motor is wired for 115-120 volt operation. Connect to a 20 amp. branch circuit and use a 20 amp., time-delay fuse.

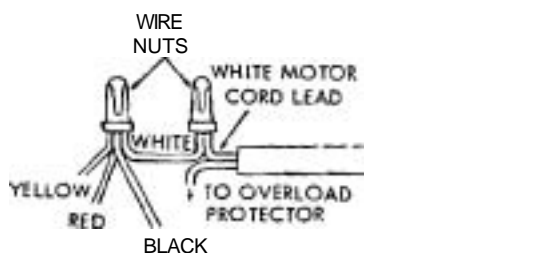
ELECTRICAL CONNECTIONS

NOTE: This saw motor is wired at the factory for 120-volt, 60 cycle, AC service as shown in figure 1 and described in paragraph 1, below. Under normal home workshop use with proper voltage to the motor, the saw will operate with adequate efficiency. However, if any of the following conditions exist, it may be necessary to reconnect the saw for 240 volts AC as described in paragraph 2, below.

1. Continuous heavy-duty use.
2. Undersize wiring in circuit from motor to power source, or overloaded circuit.
3. Low voltage from power source to motor (which may be due to overloaded power source).

The power cord must also be changed from the 120-volt type to the 240-volt type, when changing to 240-volt operation.

1. Connections For 120-Volts AC. (See figure 1.) When replacing a motor or connecting the saw to 120-volts for any reason, make sure the wires inside the motor terminal box are connected as follows:
 - a. Connect the YELLOW, WHITE, BLACK and RED leads from the motor terminal box to the WHITE motor cord



120 VOLTS

figure 1

- lead. (The black motor cord lead is already connected to the overload protector.)
 - b. Connect the GREEN and BROWN leads to the BLUE lead.
 - c. Twist bare ends of wires together and install a wire nut on each connection.
 - d. Push all leads carefully into motor terminal box and install terminal box cover.
2. Connections For 240-Volts AC. (See figure 2.) When connecting the motor for 240-volt operation, the following connections must be made inside the motor terminal box:
 - a. Connect the YELLOW, WHITE and BLACK leads from motor terminal box to the WHITE motor cord lead. Twist bare ends together and install a wire nut as shown in figure 2.
 - b. Leave the BROWN lead (from overload protector) disconnected and insulate it with tape to prevent short circuiting inside motor terminal box.
 - c. Connect the GREEN, RED and BLUE leads together, twist bare ends and install a wire nut.
 - d. Push all leads carefully into motor terminal box and install terminal box cover.

3. Modifying the Power Cord.

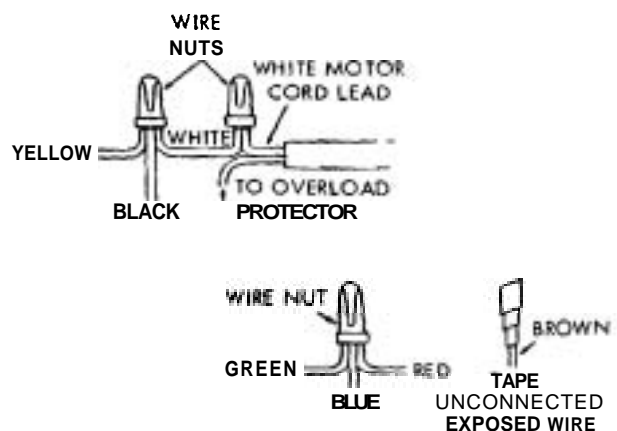
- a. Cut off the existing molded plug (for 120-volts).
- b. Attach an appropriate 240-volt plug.

CAUTION: Do not connect the standard 120-volt plug to a 240-volt receptacle.

MOTOR SAFETY PROTECTION

The saw motor is equipped with a manual-reset thermal overload protector, designed to open the power line circuit when the motor temperature exceeds a safe value.

1. If the protector opens the line and stops the saw motor, press the saw switch to the "OFF" position immediately and allow the motor to cool.
2. After cooling to a safe operating temperature, the overload protector can be closed manually by pushing in the red button on the motor capacitor cover. If the red



240 VOLTS

Figure 2

button will not snap into place immediately, the motor is still too hot and must be allowed to cool for a while longer. (An audible click will indicate protector is closed.)

3. As soon as the red button will snap into running position, the saw may be started and operated normally by pressing the saw switch to the "ON" position.
4. Frequent opening of fuses or circuit breakers may result if motor is overloaded, or if the motor circuit is fused with a fuse other than those recommended. Do not use a fuse of greater capacity without consulting the power company.
5. Although the motor is designed for operation on the voltage and frequency specified on motor nameplate, normal loads will be handled safely on voltages not more than 10% above or below the nameplate voltage. Heavy loads, however, require that voltage at motor terminals be not less than the voltage specified on nameplate.
6. Most motor troubles may be traced to loose or incorrect connections, overloading, reduced input voltage (which results when small size wires are used in the supply circuit) or when the supply circuit is extremely long. Always check connections, load and supply circuit when the motor fails to perform satisfactorily. Check wire sizes and lengths with the table in the next paragraph.

WIRE SIZES

The following table lists recommended wire sizes for connecting the motor to the power source. These sizes should be maintained for trouble-free operation of the saw.

| Length of Conductor | Wire Size Required (American Wire Gauge No.) | |
|----------------------|---|----------------|
| | 120 Volt Lines | 240 Volt Lines |
| 50 feet or less | No. 12 | No. 14 |
| 100 feet or less | No. 10 | No. 12 |
| 100 feet to 150 feet | No. 8 | No. 10 |
| 150 feet to 200 feet | No. 6 | No. 8 |
| 200 feet to 400 feet | No. 4 | No. 6 |

NOTE: For circuits of greater length, the wire size must be increased proportionately in order to deliver ample voltage to the saw motor.

NOTE: The seven basic "steps" that follow are essential in order to insure correct alignment of the saw.

WARNING: Make sure the power cord is not plugged into an electrical outlet when working on the saw.



STEP ONE — INSTALLATION OF FRONT TABLE

1. Place the large front table board on table supports so that holes in board match holes in supports. (See figure 3.)
2. Place a 1/4-inch plain washer and a 1/4-20 x 1-inch screw in each of the seven counterbored holes located above the table supports. One screw is threaded into a "U"-clip nut mounted on the No. 2 support.
3. Attach lockwashers and nuts to the six screws in the table supports. Do not tighten these screws at this time.

STEP TWO — CHECKING FOR LOOSENESS OF COLUMN TUBE IN COLUMN SUPPORT

1. Tighten arm latch handle (22, figure 20.)
2. Grasp arm latch handle (22, figure 20) with one hand and hold fingers of other hand at parting line between column tube and column support. (See figure 4.) Apply gentle side force to the radial arm in opposing directions. Any looseness between column and column support (indicated by arrow in figure 4) can be felt with fingers.
3. If looseness can be felt, at point indicated by the arrow in figure 4, perform operations outlined in instructions that follow:

NOTE Before attempting to adjust the column tube key, the function of this adjustment should be understood. Figure 5 shows a sectional view through the column tube support (looking downward) at this location. By loosening the left-hand set screw and tightening the right-hand set screw the column tube key will be forced tighter into the column tube keyway. Conversely, loosening the right-hand set screw and tightening the left-hand

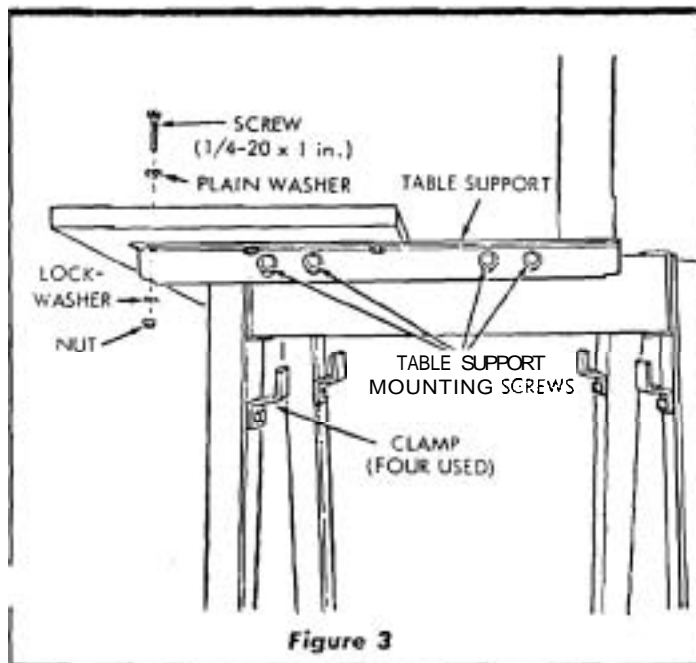


Figure 3

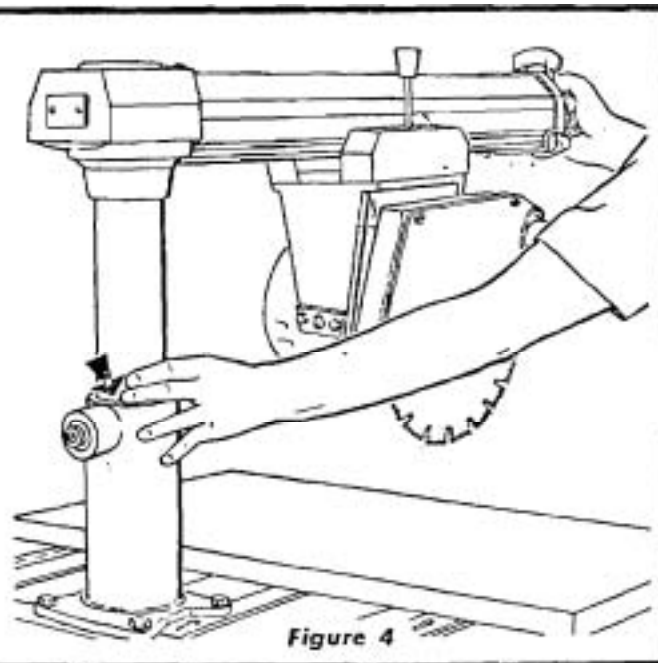


Figure 4

set screw, the column key will be retracted out of the column tube keyway. The set screw in outer end of column tube key must be loosened while adjustment is being made and tightened with medium firmness after adjustment is completed. This screw applies pressure on the Nylon friction plug and provides smoother elevation movement of column tube. This set screw should be tightened to provide maximum smoothness of operation. Right and left positions are given with operator facing the saw — standing in front of saw table.

- Loosen set screw in center of column tube key. (See figure 5.)
- Loosen left-hand set screw $1/4$ turn. (See figure 5.)
- Tighten right-hand set screw. (See figure 5.)
- Tighten left-hand set screw. (See figure 5.)
- Turn elevation crank to raise and lower radial arm. (See figure 6.) If too tight, loosen right-hand set screw (figure 5) slightly and check again for smooth operation. When correct, tighten left-hand set screw
- Tighten set screw in center of column tube key (figure 5) until smoothest operation is obtained.
- Lock the yoke clamp handle (7, figure 20) and bevel lock knob (17) securely.

STEP THREE — SQUARING THE CROSS CUT

- Loosen the arm latch handle (22, figure 20) $1/4$ turn. Make sure the yoke clamp handle (7) and bevel lock knob (17) are tight.
- Pull the arm latch lever (1) outward and move radial arm approximately 10° to the right. Release arm latch lever and move radial arm into the 0° (index) position. Do not bump or jar the arm. Push the arm latch handle, or arm latch lever solidly with palm of hand in order to seat arm lock pin in the arm latch. (Refer to figure 24.)
- Tighten arm latch handle. (Refer to "PRECISION INDEXING" for detailed instructions on indexing the radial arm.)
- Place a framing square on the table as shown in figure 7 and position the saw and square until the leg of the square just contacts a tooth of the saw blade. (Position "A", figure 7.) Mark this tooth with crayon or chalk.
- When the carriage is moved back and forth on the radial arm, the saw tooth "A" should just touch the square at all positions. If saw tooth "A" does not touch the square at all points, make the following adjustments:
 - If saw tooth ("A", figure 7) moves away from the square when moving the blade from the rear toward the front of the table, tap the right-hand front edge of the table.
 - If the saw tooth ("A", figure 7) moves into the square when moving saw from the rear to the front of saw table, tap the left-hand front edge of table.
 - Recheck... and, if correct, tighten all table hold-down screws. (See figure 3.)
- In extreme cases, due to rough handling during shipment, the above adjustment procedure may not be sufficient. Make the following adjustment only after tightening the table screws and the cross-cut cannot be squared according to the preceding adjustment routine.
 - Remove three screws (1 and 2, figure 8), miter-scale indicator (3) and radial arm cap (4).

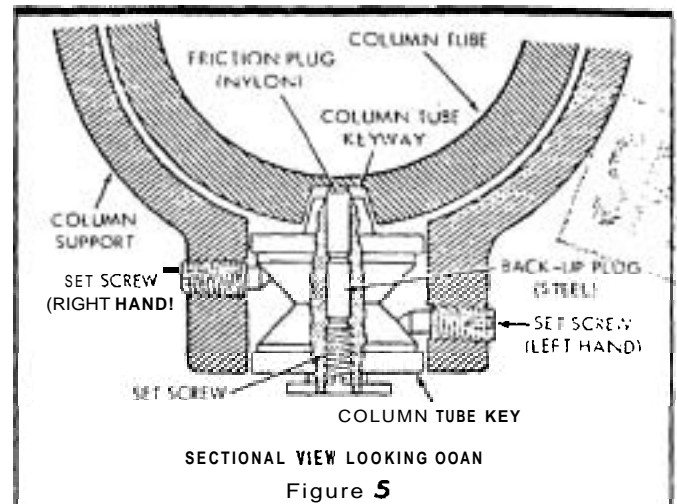


Figure 5

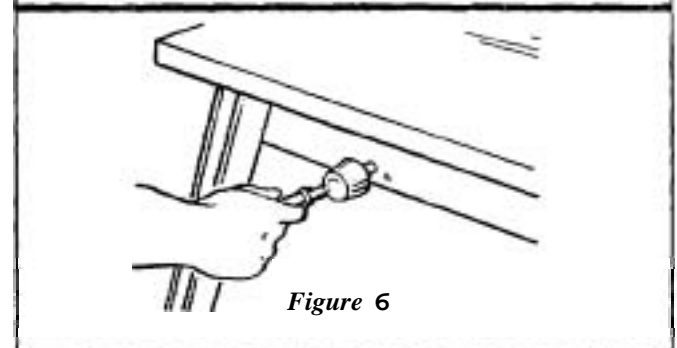


Figure 6

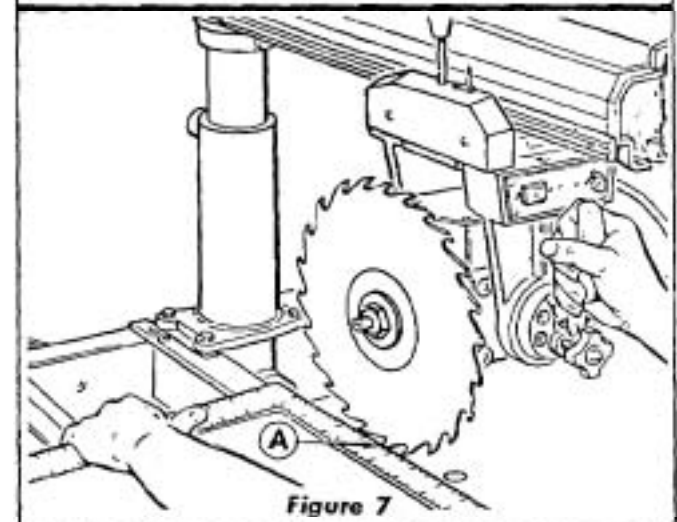


Figure 7

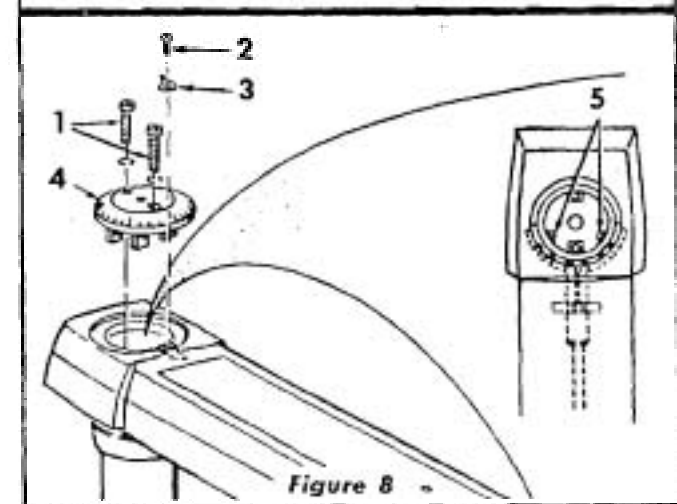


Figure 8

- b. Turn the arm latch handle (22, figure 20) one-quarter turn **counterclockwise** but do not pull it out.
- c. Loosen (do not remove) two hex-head screws (5, figure 8) located inside the column tube.
- d. Move radial arm slightly in the proper direction to make saw tooth ("A", figure 7) follow edge of square when the saw blade is moved in and out in a "cross-cut" manner.
- e. Re-tighten the hex-head screws (5, figure 8) and arm latch handle.

- f. Recheck travel of blade tooth ("A") **with** the square.
- g. After the cross-cut has been **accurately** squared, install the radial arm cap (4, figure 8), miter-scale indicator (3) and screws (1 and 2). Set the indicator (3) at 0° position.

STEP FOUR— ADJUSTING THE TABLE PARALLEL TO RADIAL ARM

NOTE: DO NOT USE A CARPENTER'S LEVEL.

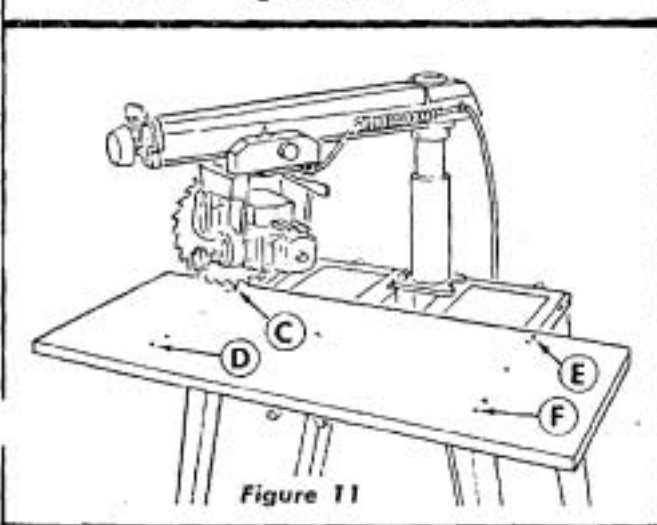
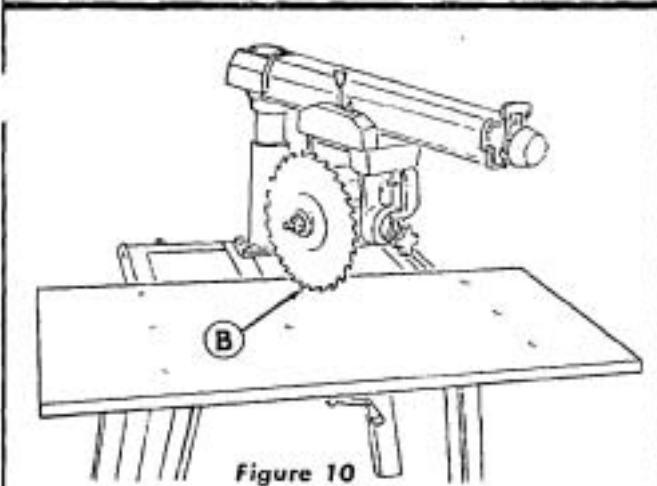
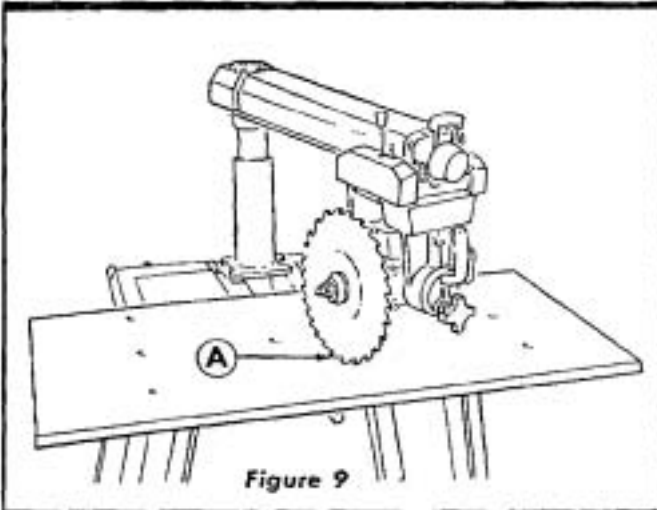
1. Remove the saw guard.
2. Loosen table support mounting screws (figure 3) at both left and right sides of the base. Re-tighten to finger tightness for adjustment of table.
3. Loosen arm latch handle (22, figure 20) enough to obtain free movement of radial arm. Release arm latch lever (1, figure 20), and loosen carriage lock knob for easy movement of motor and carriage assembly during this operation. Move the motor and carriage assembly out to the end of radial arm and lower the saw blade until it just touches the table at point A, which is the front central position. (See figure 9.)

NOTE: Actual contact with table can be determined by rotating saw blade and listening for a light "pinging" sound as the carriage is lowered.

4. Move the blade to point B near the rear edge of table. (See figure 10.) If saw blade starts to ride on table as it is moved rearward, loosen the nut near the rear of the No. 2 table support and tap the table downward until the blade just contacts the table at this point. If table is too low at the back, tap it upward until a pinging sound can be heard as blade is rotated. Recheck at both A and B locations and correct as required. Tighten nut at rear of No. 2 table support when correct center height is obtained.
5. Move the blade to the left-rear of table at point C and tap table up or down as required. (See figure 11.) Then move blade to point D and adjust table as required. Tighten screws in **left-hand** table support angle when height is correct. (See figure 3.)
6. Move blade to points E and F and adjust the right-hand table support in the same manner as described for the left-hand support. Tighten screws in right-hand support when adjustment is correct.
7. Move the saw blade to all six positions to recheck for proper leveling of table. (See figures 9, 10 and 11.) Make slight corrections if required, and make sure all support mounting screws are tight. (See figure 3.)
8. Place the rip fence in vertical position behind the front table board.
9. Place the rear table board behind the rip fence and the table spacer board behind the rear **table**.
10. Insert the three table clamps (9, figure 20) and tighten them finger tight to secure all table boards.

STEP FIVE— SQUARING THE SAW BLADE TO THE TABLE TOP

1. Place the edge of a framing square on the table top and against the saw blade, as shown in figure 12.



2. When the saw blade is square with the table top, no light will be visible between the square and face of saw blade. Do not allow the square to rest against a tooth of the saw. If light is visible between the square and face of saw blade (with square leg held firm against the table top) perform the following adjustments:

- a. Using a 1/4-inch hex "L" Allen wrench, loosen just slightly the four socket-head screws (2, figure 12).
- b. Tilt the motor until the saw blade is square with the table top as shown in figure 12. Then, while holding the square firmly against the saw blade and table top, apply pressure against lower part of saw blade with the thumb until approximately 1/32-inch clearance exists between the square and lower edge of saw blade. This is to compensate for the possible slight shifting of the motor while screws (2) are being tightened.
- c. Tighten the four socket-head screws (2, figure 12).

NOTE: It may be necessary to perform more than one trial operation before the saw blade remains perfectly square with table top after screws have been tightened.

- d. Recheck for blade squareness with table top.
- e. The indicator (3, figure 12) should read 0° on the bevel index scale. If not, loosen the indicator attaching screw, adjust indicator to zero and tighten the screw securely.

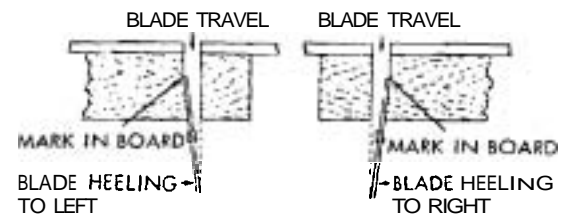
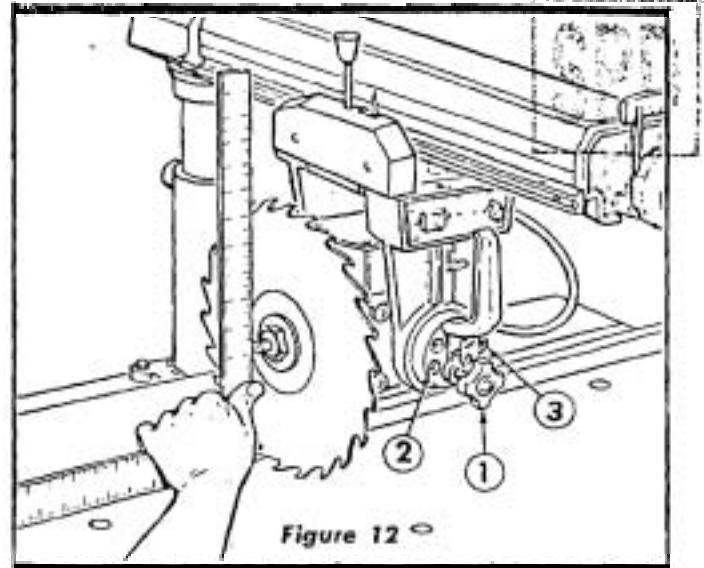


Figure 13

STEP SIX—CHECKING THE SAW BLADE FOR "HEEL" (LEFT AND RIGHT)

1. Place a square against the rip fence and the saw blade as shown in figure 14. The long leg of the square must be held firmly against the rip fence and table top and the short leg must not touch any of the teeth on the saw blade.
2. If a gap exists between the saw blade and the square, one of two types of "heel" exists. (See figure 13.) To correct for either type of condition, proceed as follows:
 - a. Remove the left-hand carriage cover (1, figure 14) by removing the two attaching screws (2).
 - b. Loosen the yoke clamp handle (7, figure 20).
 - c. Loosen (slightly) two hex-head screws (1, figure 15).
 - d. Rotate the yoke until the gap between saw blade and square is eliminated. (See figure 14.)
 - e. Lock the yoke and tighten the two hex-head screws (1, figure 15).
 - f. Recheck for "heel" after tightening screws, and make corrections if necessary.
 - g. Install left-hand carriage cover. (See figure 14.)

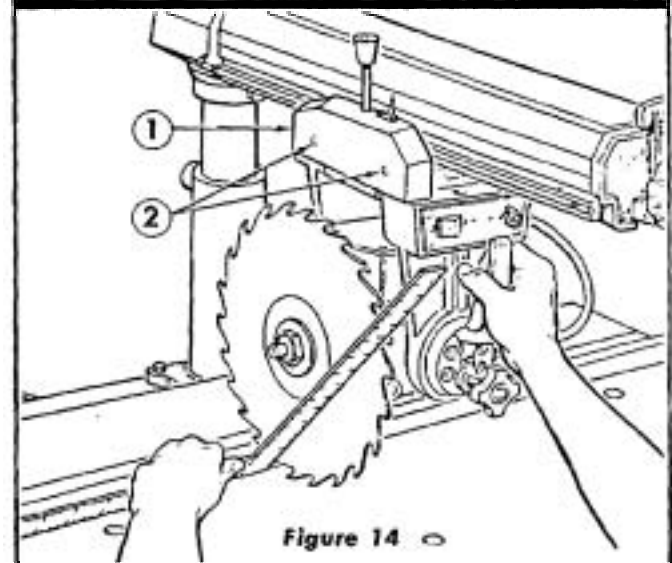
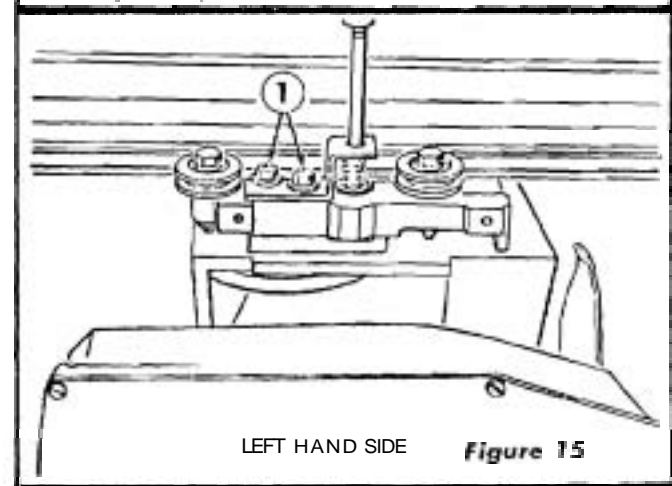


Figure 14

STEP SEVEN—DOUBLE CHECK SQUARING OF SAW

1. Recheck for correct adjustment of the saw by performing "STEPS THREE, FIVE and SIX".
2. If the cross-cut is not perfectly squared, proceed with "STEP THREE" (paragraphs 5 and 6), and "STEP SIX", if a correction is required.

NOTE: If after making all adjustments outlined in STEPS "ONE" through "SEVEN," refer to Trouble Shooting Charts for any existing problems.



LEFT HAND SIDE

Figure 15

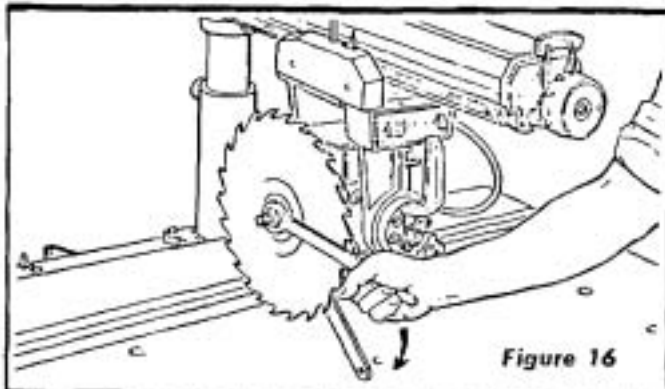


Figure 16

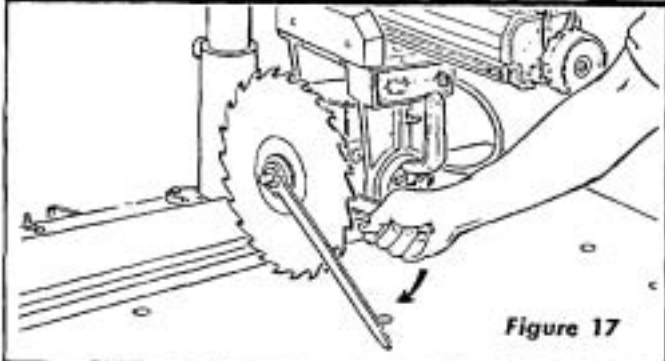


Figure 17

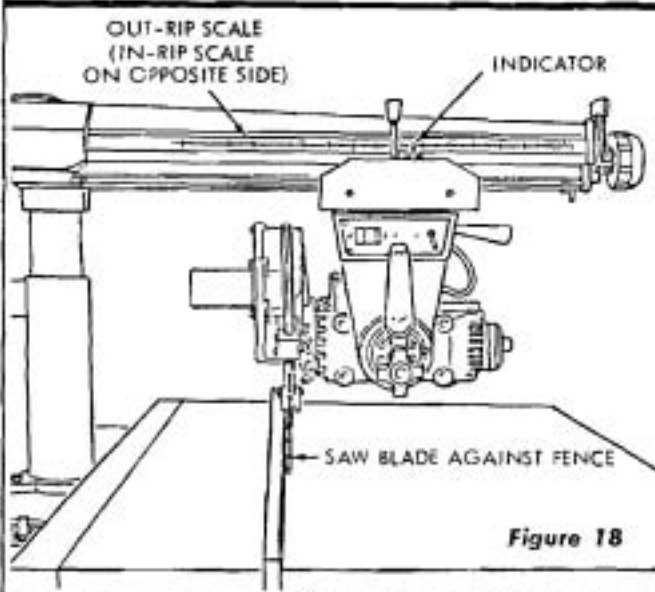


Figure 18

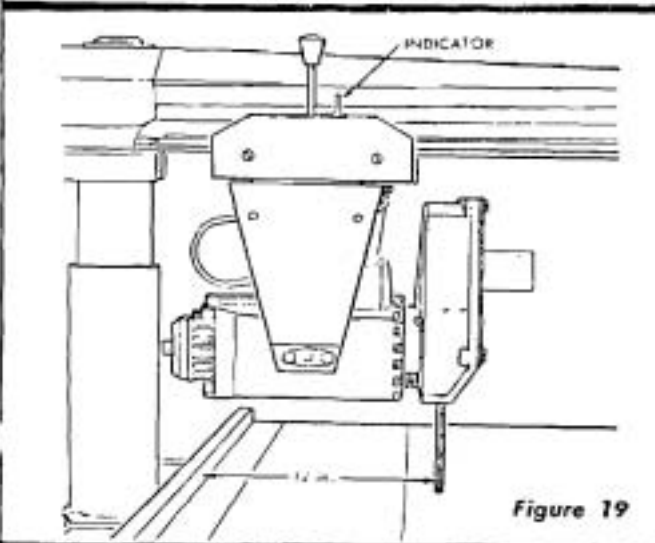


Figure 19

ATTACHING AND DETACHING SAW BLADE

1. Locate the motor carriage assembly midway on radial arm and tighten carriage lock knob (6, figure 20).

2. REMOVAL (See figure 16.)

- a. Place the open-end shaft wrench on hex portion of motor shaft on inside of saw blade. Allow end of wrench to rest on saw table.
- b. Using the box-end arbor wrench, loosen the shaft nut.

NOTE: The motor shaft has left-hand threads.

- c. Remove shaft nut, collar, saw blade and second collar.

3. INSTALLATION (See figure 17.)

- a. Place inside collar on motor shaft, with flange next to saw blade.
- b. Install saw blade, outside collar and nut.

NOTE: Make sure the larger (flange) face of each collar is next to saw blade.

- c. Place box-end arbor wrench on shaft nut and let it rest on saw table.
- d. Use open-end shaft wrench on hex portion of shaft and tighten by pushing downward as shown in figure 17.

ADJUSTMENT OF RIP SCALE INDICATORS

NOTE: The rip scales and pointers are intended to be used for quick settings. For greater accuracy, take direct measurement between blade and fence.

1. When the fence is in its normal position (next to the front table), index the yoke 90° from the cross-cut position so that the blade is between the motor and the fence. Lock the yoke.
2. Move the motor along the radial arm until the blade, when spun by hand, just touches the front face of the fence. (See figure 18.) The indicator on the right-hand side of radial arm should now read 0-inches on lower portion of the "In-Rip" scale. If not, loosen the two screws and shift the indicator to read 0-inches.

NOTE: With the saw blade and fence in the position shown in figure 18, the lower portion of the "in-Rip" scale is used. If the fence is moved to the extreme rear position, the upper portion of the scale is used.

3. The "Out-Rip" scale pointer, located on the left-hand side of radial arm, is adjusted in essentially the same manner as the "in-Rip" scale pointer, except the blade should be positioned as shown in figure 17. With 12-inches measured between the fence (when in full rear position) and face of saw blade, the pointer should be set to the 12" position. The upper portion of the "Out-Rip" scale is used when the fence is in the rear position. (See figure 19.) The lower portion of the scale is used when the fence is located in the usual position — at the rear edge of front table board.

OPERATING CONTROLS

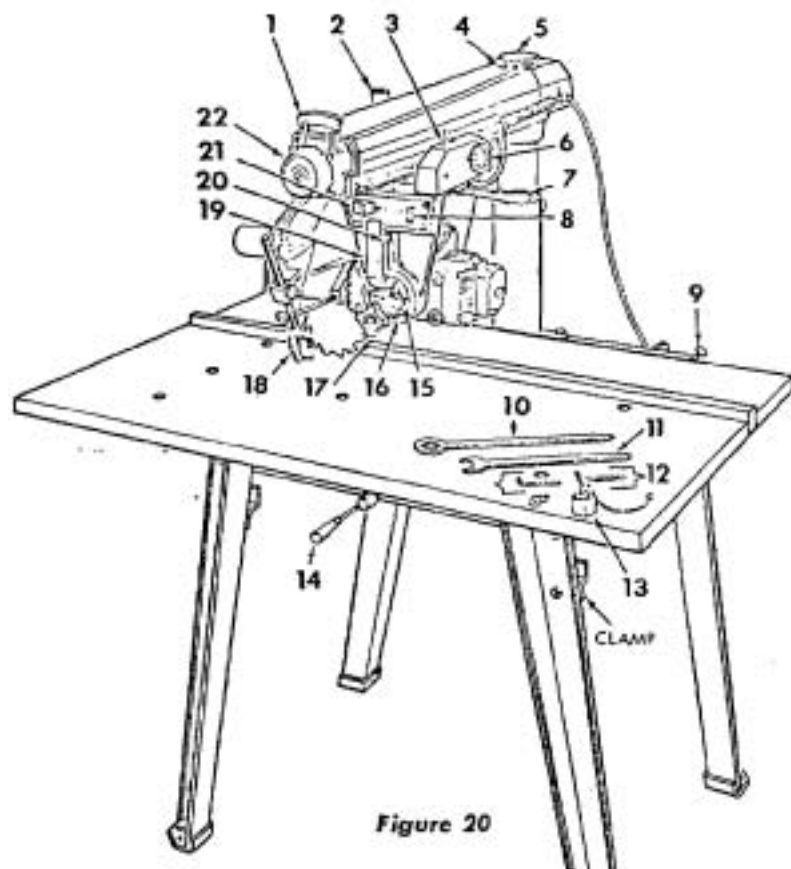


Figure 20

- | | |
|--------------------------|---------------------------------|
| 1. Arm Latch Lever | 12. Allen Wrenches |
| 2. Swivel Latch Pin Knob | 13. Adapter Plug |
| 3. Rip Scale Indicator | 14. Elevation Crank |
| 4. Radial Arm Indicator | 15. Bevel Index Indicator |
| 5. Radial Arm Scale | 16. Bevel Index Scale |
| 6. Carriage Lock Knob | 17. Bevel Lock Knob |
| 7. Yoke Clamp Handle | 18. Anti-Kickback Pawl Assembly |
| 8. Switch Lock and Key | 19. Bevel Index Handle |
| 9. Table Clamp | 20. Latch Pin Handle |
| 10. Arbor Wrench | 21. On-Off Switch |
| 11. Shaft Wrench | 22. Arm Latch Handle |

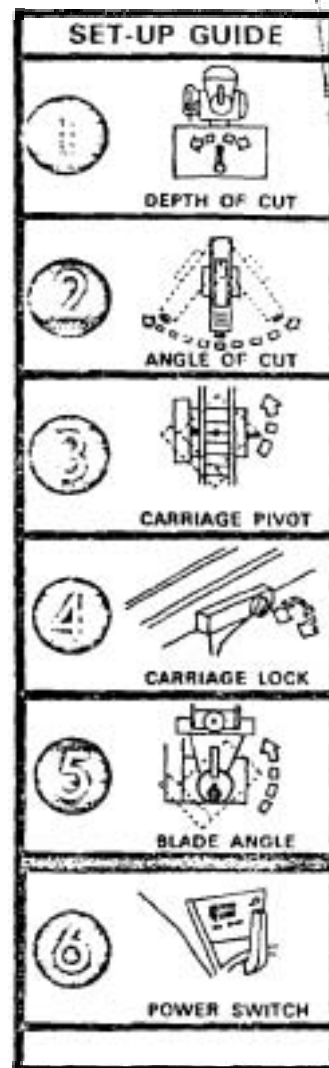


Figure 21

SET-UP GUIDE

A combined number and color code system, designated as a "SET-UP GUIDE", has been applied to the saw in order to simplify the location of controls required for a particular set-up operation. The "SET-UP GUIDE" is both a convenience and safety measure, particularly for inexperienced operators. The operator should become familiar with this feature before operating the saw. A brief explanation of the "SET-UP GUIDE" is as follows: (See figure 21.)

1. Notice the radial arm trim strip, the forward end of which contains six diagrams numbered "1" through "6". Each number is in a colored circle, and a corresponding number in an identical colored circle will be on the particular operating control member involved.
2. Locate each control and become familiar with its operation.
 - a. "DEPTH OF CUT". Diagram shows the elevation crank which is used to raise and lower the blade. The numeral "1" in a light-blue circle is on the crank handle.

- b. "ANGLE OF CUT". Two controls are involved in releasing, securing and indexing the angle of the radial arm. These are: arm latch handle and arm latch lever. The handle is marked with a dark-blue circle.
- c. "CARRIAGE PIVOT". Two controls are used in this operation. They are: swivel latch knob and yoke clamp handle, each marked with the numeral "3" in an orange circle.
- d. "CARRIAGE LOCK". The carriage lock knob is rotated clockwise to secure the carriage on radial arm, and counterclockwise to release it. The numeral "4" in a green circle is at the center of the knob.
- e. "BLADE ANGLE". The two controls used in angular positioning and indexing of the motor to provide the desired saw blade angle are: bevel lock knob and latch pin handle. The numeral "5" in a yellow circle is attached to the bevel lock knob. The latch pin handle is painted yellow.
- f. "POWER SWITCH". This switch is located in the upper left area of the carriage and has the numeral "6" in a red circle directly under it.

USE OF KEY AND SWITCH

NOTE: This saw cannot be operated without the key, and likewise, the key cannot be removed from the lock while the saw motor is running. This feature was designed into your saw for safety and protection.

1. Insert key in slot and turn it. (See figure 22.)

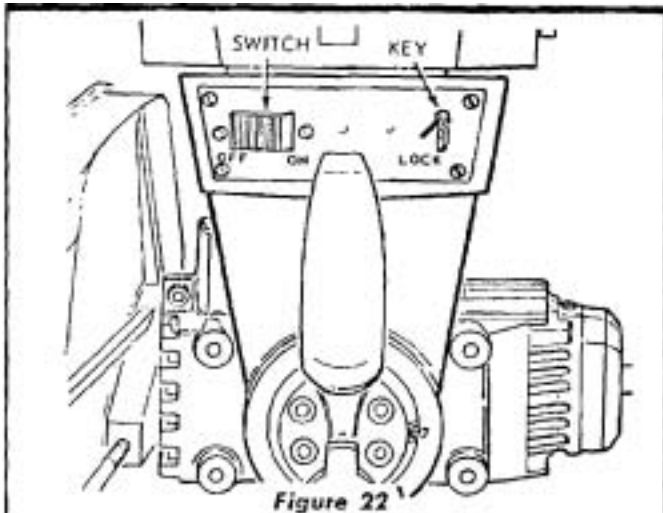


Figure 22

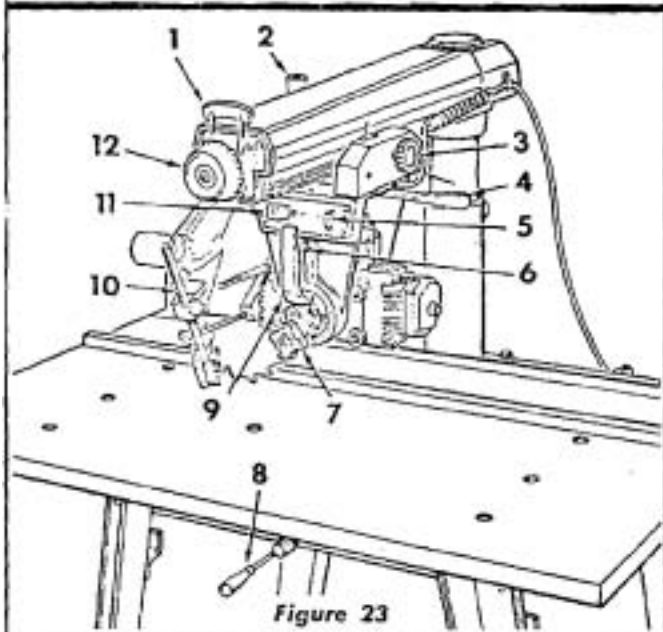


Figure 23

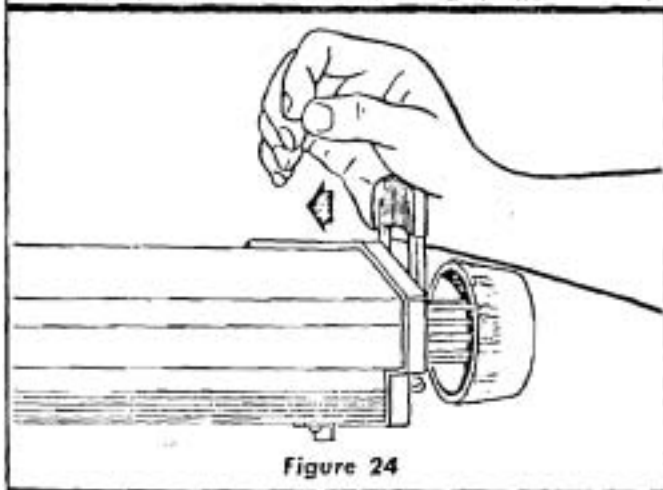


Figure 24

2. Press the right-hand side of toggle switch lever to turn the saw **ON**. Press left-hand side of switch to turn saw **OFF**.

RAISING AND LOWERING THE RADIAL ARM

This is accomplished by the elevation crank (8, figure 23). **One** complete turn of this handle will raise or lower the radial arm **1/8-inch**.

LOCKING THE CARRIAGE TO THE RADIAL ARM

This is accomplished by the carriage lock knob (3, figure 23). Turn the knob clockwise to lock; **counterclockwise** to unlock.

ANGULAR MOVEMENT AND LOCKING OF RADIAL ARM

These movements are controlled by the arm latch lever (1, figure 23) and the arm latch handle (12). The radial arm can be rotated **360°** and locked in any position. The arm is unlocked from any position by a slight counterclockwise rotation of the arm latch handle (12) and is locked in any position by rotating the arm latch handle clockwise until tight. The radial arm has positive stops at **0°** and **45°** left and right, and is released from these index positions by unlocking the arm latch handle (12) and pulling out the arm latch lever (1).

For most positive and **accurate** settings at the index positions, the following is recommended:

1. If the radial arm is already indexed, **rotate** the arm latch handle (12, figure 23) 1/4 turn counterclockwise from the locked position, pull out the arm latch lever (1) and move the radial arm off the index position. Release the arm latch lever (1).
2. Move the radial arm into the index position (do not bump or jar it) and push on the handle (12) or arm latch lever (1) solidly with the **palm** of the hand. (See figure 24). This is very important as it insures proper seating of the arm lock pin in the arm latch, thus always returning the arm to the correct cross-cut (**0°**) position.
3. Lock the radial arm by rotating the arm latch handle (12, figure 23) clockwise until tight.

CAUTION: When moving the radial arm in any direction beyond **45°** left or right, always pull out the arm latch lever (at end of radial arm) to prevent damaging the arm lock pin. If damage occurs, the radial arm will not index properly at **0°** and **45°** positions (left to right).

MOVEMENT AND POSITION OF MOTOR IN YOKE

These movements are controlled by the latch pin handle (6, figure 23) and bevel lock knob (7). The bevel scale indicates the angular position of the motor with respect to horizontal from **0°** to **90°** in either vertical position. The latch pin handle (6) **automatically** indexes the motor at **0°, 45°** and **90°** up and down. Lift the latch pin handle to release. At any other position, the latch pin handle is not engaged. The bevel lock knob (7) locks the motor to the yoke when the motor is in any position. Rotate it clockwise to lock; counterclockwise to unlock.

MOVEMENT AND POSITION OF THE YOKE

These are controlled by the swivel latch pin knob (2, figure 25) and the yoke clamp handle (4). The swivel latch pin knob automatically indexes the yoke at each **90°** position. Lift the knob to **release**. The yoke clamp handle (4) locks the yoke to the carriage in any position. Pull the handle to release. Push it to tighten.

PRECISION INDEXING

Experienced operators of precision equipment, such as this Craftsman Saw, normally acquire the habit of indexing the machine in one direction **only** whenever a new setting is made in **preparation** for a different **operation**. For **example**: When moving the radial arm to a new position, it is advisable to move it **slightly** past the desired index position then move it back slowly and carefully to latch and lock it. (See figure 24). Swivel indexing and bevel indexing can be accomplished in the same manner. This technique tends to neutralize any stresses imposed upon saw components and contributes to the high degree of accuracy this saw is capable of producing when operated expertly.

REMOVAL OF MOTOR AND CARRIAGE ASSEMBLY

The motor and carriage assembly may be easily removed from the radial arm for servicing or storage at some loca-

tion, away from the remainder of the saw, when desired. Proceed as follows:

1. Release the power cord from cord clamp at rear of radial arm.
2. Insert the handle end of the arbor wrench (or shaft wrench) between the lower surface of radial arm and carriage to raise the carriage stop. (See figure 27.) The wrench need not be held, as it will remain in place when released.
3. Grasp motor and carriage assembly firmly and simply pull it forward, off radial arm.

NOTE: The wrench is not needed when installing the motor and carriage assembly on radial arm, as the carriage stop will raise automatically, then "snap" back into safety stop position when the carriage is moved rearward onto the radial arm.

ADJUSTMENTS TO COMPENSATE FOR WEAR

Even though the finest materials and precision workmanship have been used to minimize wear, it is reasonable to expect some wear. Adjustments have been built into your Craftsman saw to reduce or eliminate this wear.

ELIMINATING LOOSENESS BETWEEN COLUMN TUBE AND COLUMN SUPPORT

This operation is explained fully in "STEP TWO - CHECKING FOR LOOSENESS OF COLUMN TUBE IN COLUMN SUPPORT."

YOKE CLAMP HANDLE ADJUSTMENT

The normal locking position of the yoke clamp handle (1), figure 25) is approximately midway between the two sides of the yoke.

When the handle moves considerably to the rear, or strikes the yoke before locking, the handle may be adjusted as follows:

1. Remove saw guard and blade.
2. Set yoke clamp handle to Position "A", (figure 25), which is just slightly ahead of the mid-position of handle.
3. Insert the handle end of the arbor wrench (or shaft wrench) between the lower inner surface of radial arm and carriage to raise the carriage stop. (See figure 27.) The wrench need not be held, as it will remain in place when released.
4. Grasp the motor and carriage assembly and move it carefully off end of radial arm.

CAUTION: When removing the motor and carriage assembly from radial arm, be sure to hold the assembly parallel to the arm until all bearing rollers are free of their tracks. If the assembly is allowed to tilt after the forward rollers are free, the adjustment of rear rollers will be altered. This same precaution should be taken when installing the motor and carriage assembly on the radial arm.

5. Rest the motor and carriage assembly on saw table.
6. Remove the lock screw (3, figure 26).

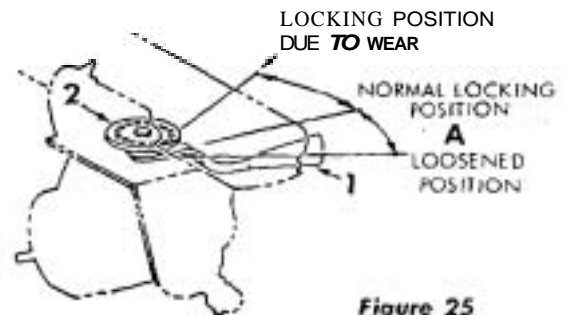


Figure 25

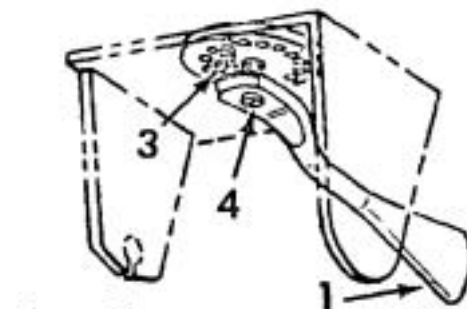


Figure 26

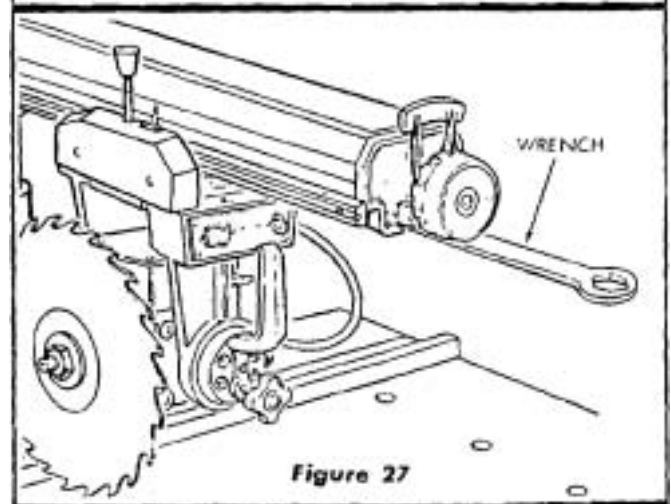
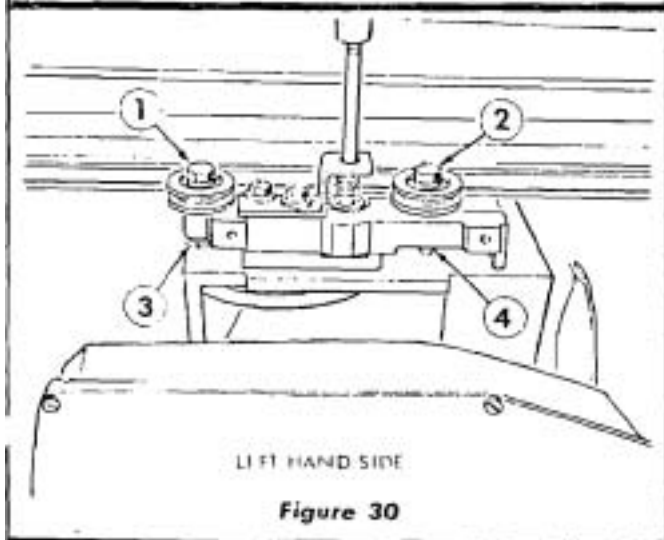
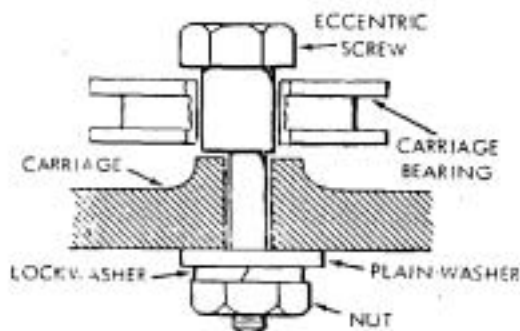
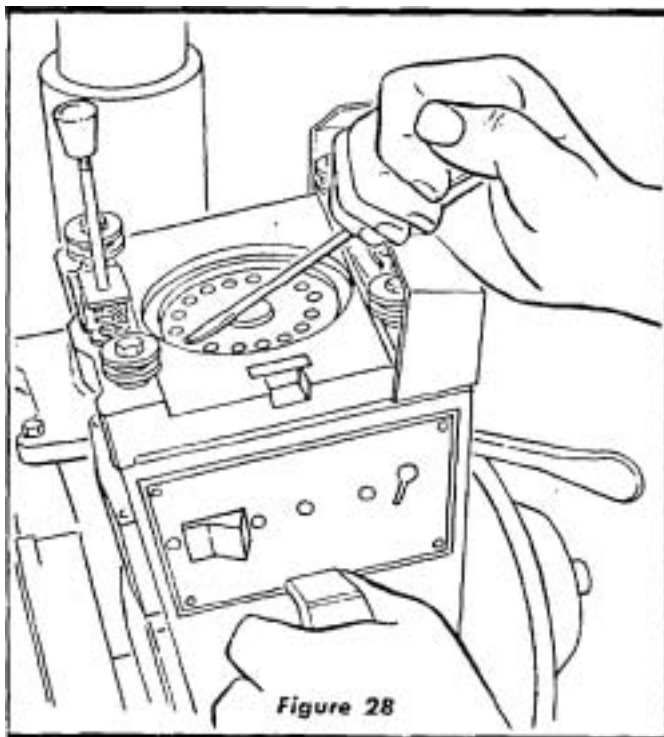


Figure 27

7. Using a screwdriver or similar tool, rotate the yoke clamp assembly (2, figure 25) clockwise (when looking down) until the next hole will line up with the lock screw (See figure 28). Usually, rotating the yoke clamp assembly one hole will correct this adjustment. However, in some cases it may be necessary to rotate it two holes.



8. Make sure the hole in yoke clamp assembly (2, figure 24) lines up with lock screw hole and install and tighten lock screw (3, figure 26)
9. Slide motor and carriage assembly on radial arm. (See "CAUTION" under preceding step 4.)

CARRIAGE BEARING ADJUSTMENT

To test for looseness in carriage ball bearings (between bearings and tracks on radial arm), lock yoke clamp handle, grasp the motor and carriage assembly firmly and apply a firm rocking motion. If looseness exists, the two bearings on left-hand side of radial arm must be adjusted. The two bearings on right-hand side of arm are attached to the carriage with regular hex-head screws and are not adjustable. The two bearings on left-hand side of arm are attached to carriage with eccentric screws. (See figure 29.)

1. Remove left-hand carriage cover (1, figure 14).
2. Loosen nuts (3 and 4, figure 30) just enough to permit eccentrics to turn. (See figure 29.)
3. Turn adjusting screws (1 and 2, figure 30) a partial turn left or right as required to take up looseness.
4. Hold head of screws (1 and 2, figure 30) in position established in preceding step and tighten nuts (3 and 4) on underside of carriage.
5. Correct adjustment exists when there is no play between the carriage and radial arm, and yet the carriage moves freely.
6. Install carriage cover (1, figure 14).

NOTE: It will probably be necessary to re-check steps "THREE, FOUR and FIVE" under "ASSEMBLING AND ADJUSTING YOUR SAW," after adjusting carriage bearings.

LUBRICATION

Your saw is a fine machine and should be given the best of care. If kept clean and properly lubricated, it will give many years of trouble-free service. Before describing the various points which may periodically require lubrication, IT IS MORE IMPORTANT TO FIRST MENTION THE VARIOUS SPOTS WHICH SHOULD NOT BE LUBRICATED.

NO LUBRICATION REQUIRED:

Do not lubricate carriage ball bearings.

Do not lubricate the motor bearings. These are sealed ball bearings and require no added lubrication.

Do not lubricate between radial arm cap and radial arm.

PERIODICALLY LUBRICATE THESE POINTS

Use SAE No. 10-30 auto engine oil and refer to Parts List for locations.

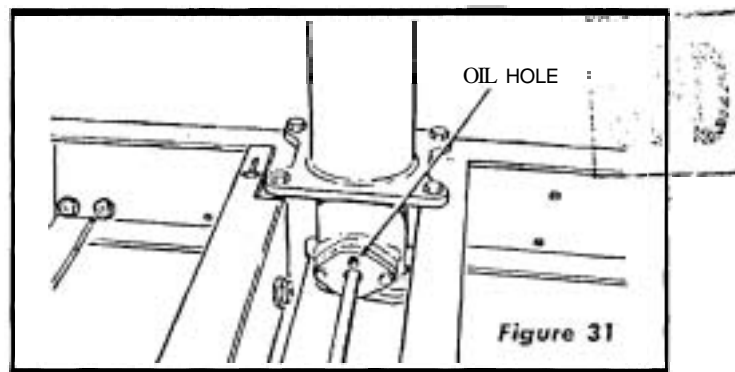
Apply a few drops of oil along the swivel latch pin only if the pin has a tendency to stick. Remove the left-hand carriage cover and use oil sparingly to prevent it from getting on the ball bearings or races.

A light film of oil can be wiped on the face of the column tube and keyway to lubricate the fit between this part and the key and column support.

Apply a few drops of oil to the bearing surfaces of the elevation crank shaft assembly. An oiling hole is provided in the elevation shaft bearing bracket to facilitate the lubrication of the bearing support. (See figure 31.)

The thread on the elevation shaft assembly can be lubricated through the oiling hole in the center of the radial arm cap.

CAUTION: Excessive oil at any location will attract dust particles and sawdust.



STANDARD SAW OPERATIONS

PRELIMINARY CROSS-CUT AT THE 0° POSITION

NOTE: The bevel index handle must be positioned at 0°, as indicated on the bevel index scale, and locked.

1. Pull motor forward of fence so that blade is free to rotate.
2. Lower radial arm until saw blade just clears the table top.
3. Tighten carriage lock knob (figure 20).

CAUTION: Before cutting, always be sure that the arm latch handle is locked.

4. Plug power cord into receptacle.
5. Insert switch key; turn the key and press the switch "ON".
6. Lower radial arm until blade cuts into table top approximately 1/32".
7. Hold the bevel index handle with the left hand and loosen the carriage lock knob with the right hand. Slowly pull the motor out to the extreme end of travel. Then push the motor back through the fence to the extreme rear position. Push the switch "OFF".

CROSS-CUTTING

Cross-cutting is the sawing of wood across the grain. Lumber is milled with the grain running the length of the board. If a straight cross-cut is desired, the board is placed on the saw table against the fence so that the grain is parallel to the fence. (See figure 32.)

NOTE: When cross-cutting normal pieces of lumber, the long end of the board should be placed to the left of the saw blade as the board is normally held by the left hand during operation. The saw is pulled through the stock — not pushed through.

The radial arm must be positioned at 0° as indicated by the radial arm position indicator. The arm latch lever must be indexed and arm latch handle tightened.

The yoke must be indexed at the 0° position, making the saw blade perpendicular to the rip fence, and the yoke clamp handle placed in the locked position. The bevel index handle must be positioned at 0°, as indicated by the bevel scale, and locked. Turn the elevation crank to lower the saw until the blade teeth are approximately 1/32-inch below the table surface and ride in the saw slot made when performing the "PRELIMINARY CROSS-CUT AT THE 0° POSITION".

Push the saw carriage to the rear of the radial arm so the blade is behind the rip fence. Adjust the saw guard so the bottom is parallel to the table and remove or set the

anti-kickback pawl assembly so it clears the board to be cut. Turn key and press the switch "On" to start the saw motor. Hold the board firmly against the rip fence with the left hand and grasp the bevel index handle with the right hand. The cut is then made by pulling the carriage forward until the saw blade cuts through the work. When the cut is complete, the saw should be returned to the back of the radial arm and the switch turned "Off". When more experience is gained by using the saw, it will be noticed that when pulling the saw toward you during cross-cutting, the saw blade tends to feed itself through the work due to the rotation of the blade and the direction of feed. Therefore, the operator should develop the habit of holding his right arm straight from the shoulder to the wrist. After this method is used a few times the operator will find that it is necessary to roll or rotate the body from the waist up. Thus, it will become apparent that very little effort is required on the part of the operator to move the saw blade through the work, and in most cases, the right arm is used merely to control the rate of feed of the saw through the board. It will also be found that when cross-cutting a thick board it will be necessary to retard movement of the saw through the work. By holding the right arm (right hand normally grips the saw handle) straight, the operator can easily control the rate of feed, thus preventing the saw blade from overfeeding and stalling the saw motor. This must be avoided whenever possible.

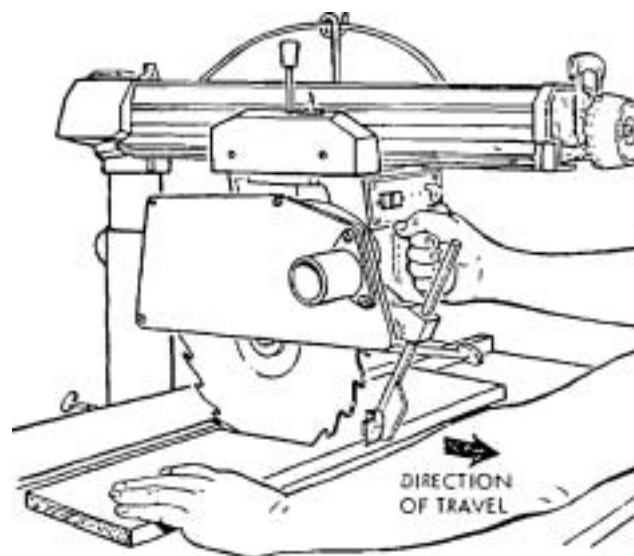
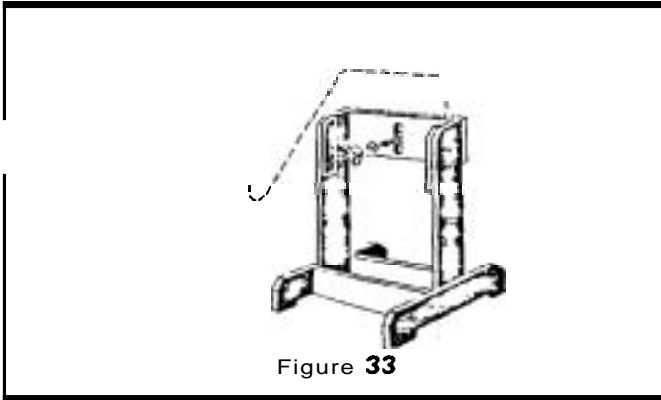


Figure 32



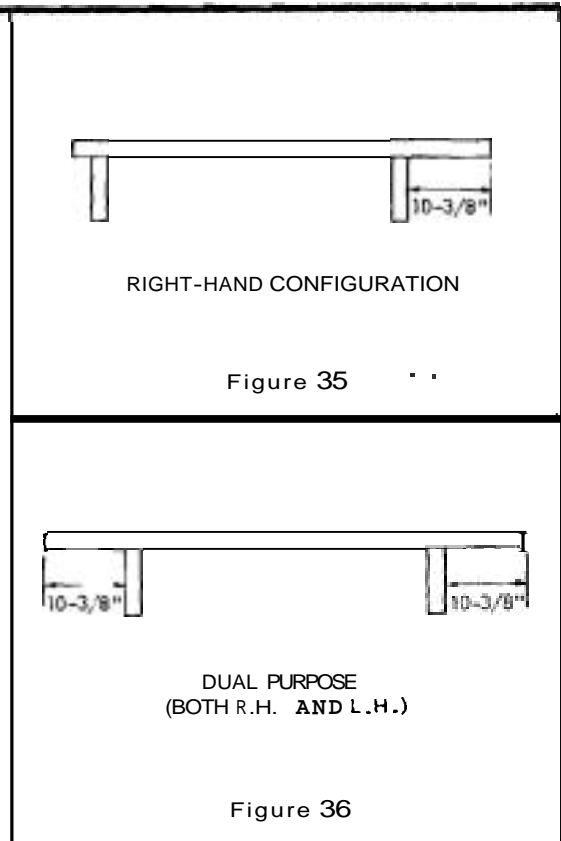
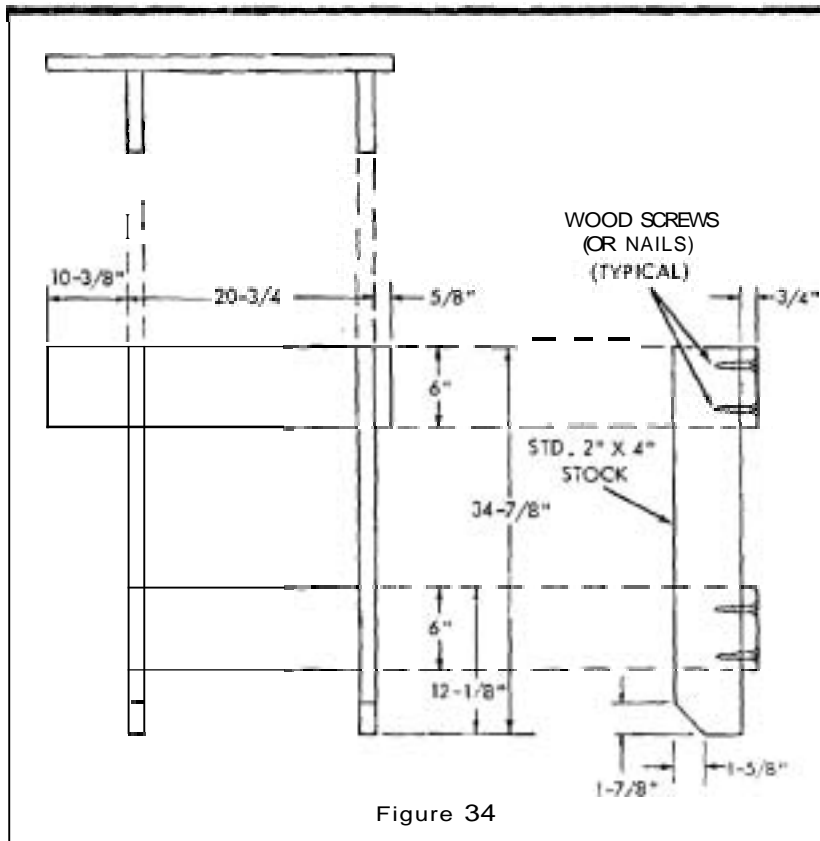
In some cases it may become necessary to cross-cut long boards which extend over the saw table on one, or both sides. This can cause buckling of the board and bind the saw during the cut. To eliminate this condition the ends of the board should be supported. Figure 33 illustrates a typical support which can be made and used to facilitate cross-cutting of long lumber.

Another type of work support for ripping long boards with the 12-inch radial saw can be constructed as follows:

1. Cut and assemble boards for the end support according to the dimensions shown in figure 34, which is designed specifically for use on the left-hand side of the saw table. The uprights are cut from standard size 2" x 4" stock and the cross pieces may be standard 1" x 6" or 2" x 6" stock. Scrap boards may be sawed to the dimensions shown, if standard 1" x 6" or 2" x 6" stock is not available.
2. Cut a corner of each upright 2 x 4 according to dimensions shown in figure 34, to fit the floor.

3. Screw or nail the cross members on the 2 x 4's as shown in figure 34. Make sure the support is square.
4. A right-hand configuration can be made by extending the top cross piece toward the opposite side as shown in figure 35. If only a single support is required, to be moved from the right or left-hand side as needed, a dual purpose unit may be made by allowing a 10-3/8" extension of the upper cross member as shown in figure 36.
5. Insert two standard 2 x 4's through the clamps on the legs of the saw table and tighten the clamps securely. These 2 x 4's may be as long as desired to handle the boards to be ripped.
6. Place the support stand in position with the upright members on the stand inside the 2 x 4's attached to saw table legs. (See figure 37.)
7. Position the lower ends of stand uprights outward until the cut angles fit the floor and secure the stand uprights to the 2 x 4's on the saw with two "C" clamps as shown in figure 37.
8. Lay a board on stand and saw table in ripping position as shown in figure 37, and adjust the angle of the stand until the board to be ripped is level with saw table.
9. If two stands are to be used, install the right-hand stand at right of saw in the same manner.

The clamp attached to each leg is for clamping one 2" x 4" board on the two front legs and another on the two rear legs. (See figure 38.) These 2" x 4" extensions may be used to attach outboard supports to assist in supporting long boards, or may be used to pick up the saw (one man at each side) and move it. They are also effective for supporting the saw in the bed of a pick-up truck when moving from one job to another.



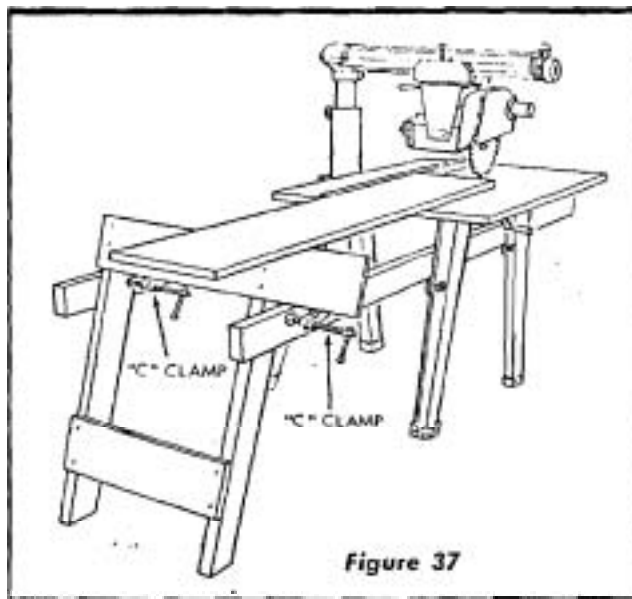


Figure 37

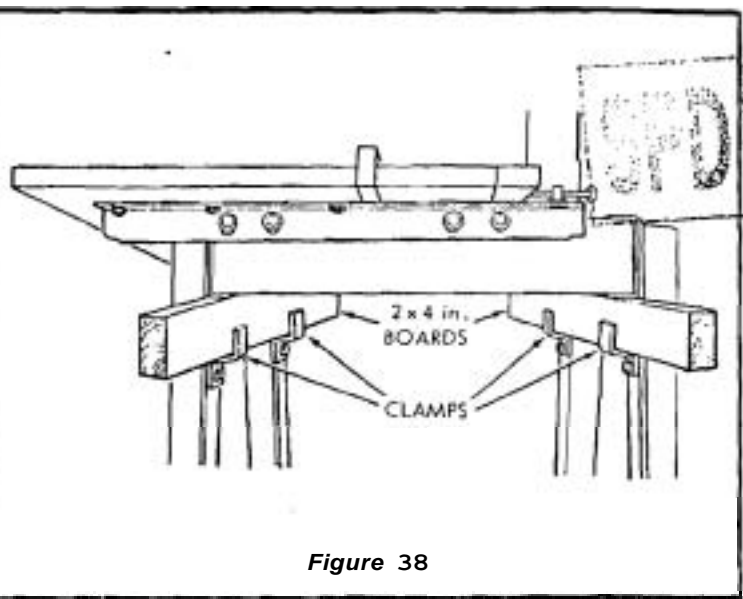


Figure 38

Holes are located in the saw base that permit legs to be extended outward horizontally if desired. This is accomplished by removing three attaching screws in each leg, rotating the leg to a horizontal position and re-installing the three screws. (See figure 39.) The lower inside screw at each location need not be removed, but should be loosened just enough to permit the leg to rotate on it as an axis.

RIPPING

Ripping is the sawing of wood with the grain. It is always done with the help of the fence as a guide to position and maintain the work at the correct width for the cut. Because the work is pushed along the fence, it must have a reasonably straight edge to make sliding contact with the fence. Also, the work must make solid contact with the table so that it will not wobble or rock. Provide a straight edge, even if this means temporary nailing or clamping an auxiliary straight edge board to the work. If work piece is warped, turn the hollow side up.

Use of the saw guard is **always** recommended; and the anti-kickback pawl assembly should always be used in both ripping operations.

Before ripping and after the saw has been positioned prior

to cutting, the saw guard and anti-kickback pawl assembly must be properly adjusted. Loosen the guard clamp screw holding the guard to the motor and lower the nose of the guard to within $1/8$ " above the top surface of the board to be cut. Retighten the guard clamp screw securely.

CAUTION: The nose of the guard refers to that end of the guard which is opposite to the end which mounts the anti-kickback pawl assembly. **Always** rip from the nose of the guard. See Warning Label on guard.

At the opposite end of the guard, loosen the wing screw holding the anti-kickback pawl assembly and lower the assembly until the tips of the pawls are $1/8$ " below the top surface of the board to be cut. Retighten the wing screw securely.

The anti-kickback pawl assembly is equipped with a "splitter" on its lower end to prevent the saw slot from closing and binding the saw blade. (See figure 40.) Therefore, the anti-kickback pawl must be adjusted so the splitter is aligned with the saw blade. This is accomplished by adjusting the two socket-head set-screws in the guard assembly. Use a straight edge against the splitter and saw blade and adjust the socket-head set-screws so the splitter is aligned with the blade when the wing screw is tightened.

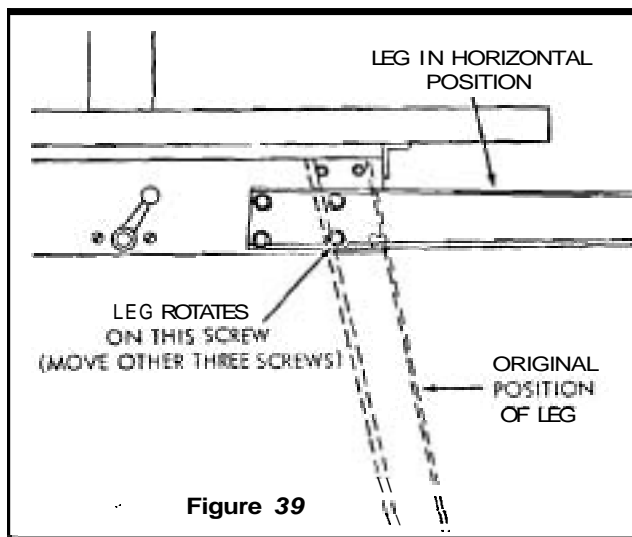


Figure 39

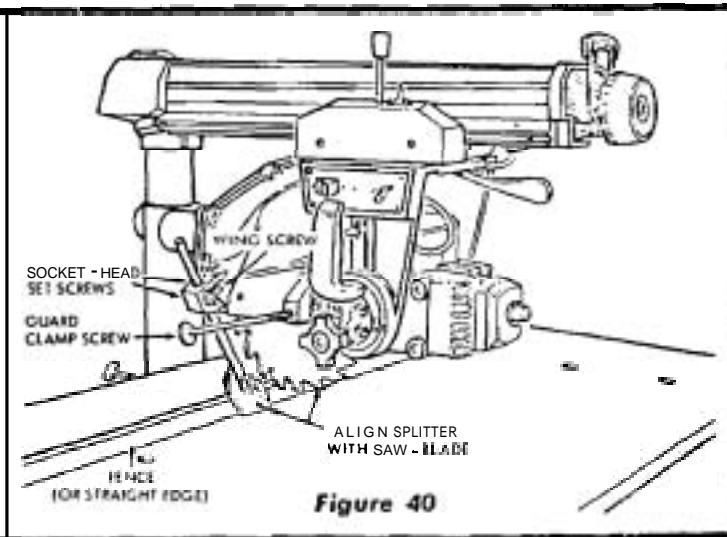


Figure 40

IN-RIPPING — refers to a position when the blade is between the motor and the fence and parallel to the fence. (See figure 41.) To place the saw in this position, unlock the yoke, disengage the swivel latch pin and rotate the yoke 90° clockwise (viewing it from the carriage) until the swivel latch pin automatically indexes the yoke 90°. Lock the yoke. Position the motor on the radial arm until the pointer on the "In-Rip" scale indicates the desired width of the finished cut board. Tighten the carriage lock knob securely. Turn the saw "On" and lower the radial arm until the saw blade cuts into the table top approximately 1/32-inch. Turn the saw "Off". Now adjust the saw guard and anti-kick pawl assembly as described in the paragraph "Ripping". The board to be ripped must be fed into the saw blade from the right-hand side of the table, therefore, the normal position for the operator is also at the right side of the table. With left hand safely clear of the blade and holding the board to be ripped down against the table and against the face of the fence as a guide, use the right hand to feed the board into the saw. The left hand should remain stationary, serving as a guide only. As the right hand approaches the left hand, hold a push stick with the right hand to complete the cut. Do not leave a long board unsupported so that the spring of the board causes it to shift on the table. A support (described in "Cross-cutting") may be used to support the board behind the blade; and if the board is very long, use another support in front of the saw. Ripped boards up to 16-inches wide can be cut in the In-Rip position.

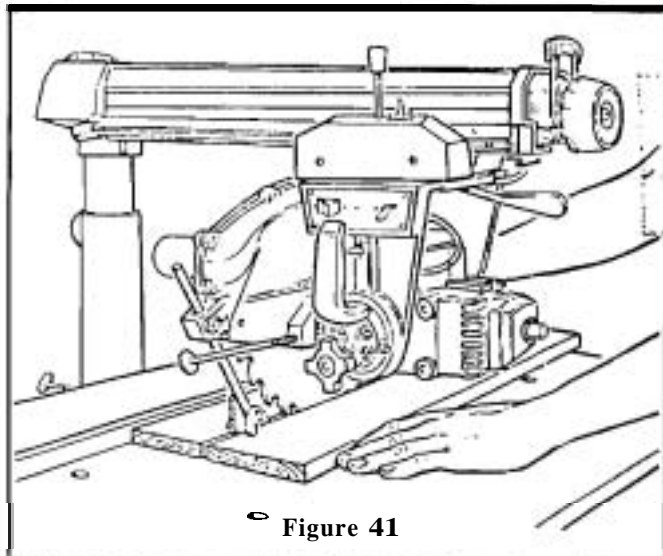


Figure 41

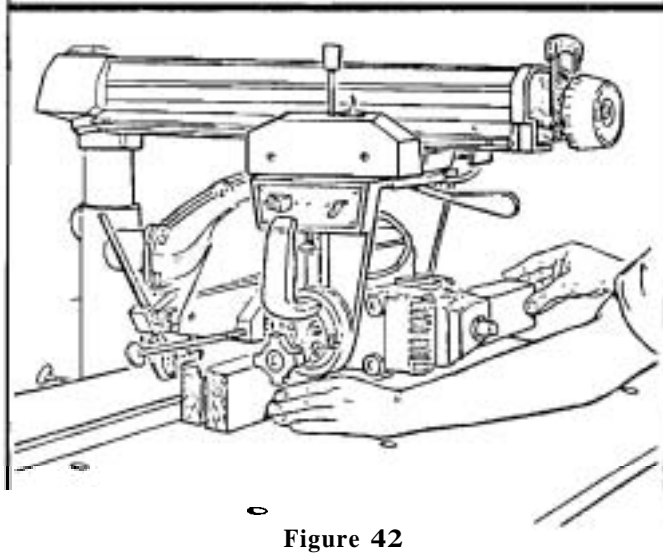


Figure 42

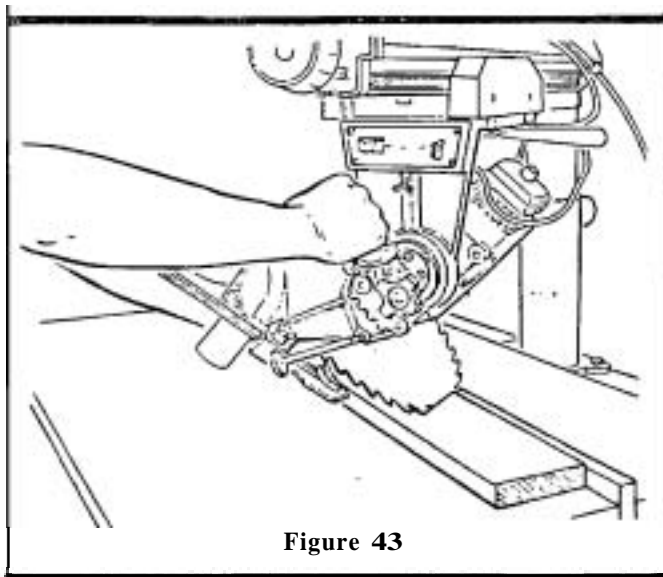


Figure 43

OUT-RIPPING — refers to a position when the blade is between the blade and the fence. Normally, this position is only used when the width of the required ripped board cannot be cut from the in-rip position. Ripped boards up to 17-1/2-inches wide can be cut in the out-rip position when the fence is against the front table. If the fence is moved to the extreme rear position against the table clamps, ripped boards up to 26-1/2-inches wide can be cut. To place the saw in the out-rip position, the yoke must be rotated and indexed 90° counterclockwise from the cross-cut position and locked. The same procedure for pre-cutting the table top (see "In-Ripping") and adjusting the anti-kickback pawl assembly should be followed. The same procedure for sawing is used except that the operator stands at the left-hand side of the table and a push stick is normally not required.

RESAWING

Resawing is cutting thick boards into thinner ones with a ripping operation. (See figure 42.) Small boards, up to 4-inches maximum width can be resawed in one pass; but larger boards require two passes, one pass along each edge of the board. When two cuts from opposite edges are required, these should be made to overlap 1/2-inch from the approximate center of the board. If the first cut is too deep, the kerf may close and bind the saw on the second cut, with danger of kickback. Also, when the kerf closes, the two sides of the cut are no longer parallel to the saw blade, and the saw will cut into them to spoil their appearance. Keep the same face of the board against the fence when making both cuts. When cutting boards thicker than 4 inches, a fence should be used which extends 3-1/2-inches above the table top.

BEVEL AND MITER CUTS

Bevel cuts may be made from either a cross-cutting or ripping position by tilting the blade to the desired angle. Miter cuts can be made only from a cross-cutting position when the blade and radial arm are at some angle other

than 90° to the fence. A bevel miter cut is a cut which is both beveled and mitered. This cut is made with the blade and radial arm set at the desired miter angle to the fence; then the blade only is tilted to the desired bevel angle. This cut is also referred to as a compound miter. (See figure 43.)

USE OF THE DADO HEAD

The dado saw (or head) is a special set of blades for cutting grooves and dados. Craftsman 8-inch Kromedge Dado Set may be purchased at any Sears Retail Store or Mail Order House. The head consists of two outside blades 1/8-inch thick, six 1/8-inch thick chipper blades and paper washers for 1/16-inch width adjustments. With these blades, grooves of 1/8-inch, 1/4-inch and, additional widths increased in steps of 1/16-inch up to a maximum of 1-inch wide, can be cut. Outside blades may be used alone, chippers cannot be used alone.

When using the maximum width of dado of 1-inch on the motor shaft, the loose collars must not be used. The width of the dado may be reduced while using the loose collar and two or more passes made with the work to obtain the desired width of cut. Whenever two or more chippers are used, stagger the cutting ends as evenly as possible around the circumference.

Fractional adjustments in thickness of the head may be made by using paper washers between outside blades and chippers. Dado head operations are essentially the same as those with a standard blade. However, the dado head takes a bigger bite, so the work-piece should be held more firmly. When a groove wider than the dado head is needed, make two or more passes. Space the cuts so they overlap a trifle. Dado work is performed in the crosscut position. Ploughing is done in the ripping position. If the rip (or plough) position is used, the anti-kickback pawl assembly should be adjusted as described in the paragraph entitled "Ripping". Rabbeting is performed in the vertical position. (See figure 44). When rabbeting, the motor is indexed 90° to the vertical position so the blades are between the table top and the motor and yoke is indexed 90° clockwise and locked. The saw is moved back on the radial arm and locked to the arm when the amount of blade extending forward of the fence is equal to the depth of the rabbet desired. If the depth of the rabbet is large, do not attempt to cut it in one operation. Lower the radial arm until the blades are in a position to cut the desired width of rabbet in the edge of the board.

MOLDING OR SHAPING

This work is done with the Craftsman Molding Cutter Head and a set of cutters, depending upon the type of molding cut desired, with the saw in the same position as that described for rabbeting. (See figure 45.) Since the position of the cutters with respect to the fence and table top can be adjusted, any (or all) of the cutter shapes may be used.

ROUTING AND DOVETAILING

Routing and dovetailing are accomplished with the motor indexed and locked 90° from horizontal, except the externally threaded stub end (opposite the normal blade end) is between the motor and table top. The following chucks will mate with this external 1/2-20 thread. (See figure 46.)

0-inch to 1/4-inch Key Chuck

5/64-inch to 1/2-inch Key Chuck

The following routers and dovetails are recommended:

| | |
|-----------------|-------------------|
| 1/8-inch router | 3/8-inch dovetail |
| 1/4-inch router | 1/2-inch dovetail |
| 3/8-inch router | |
| 1/2-inch router | |
| 5/8-inch router | |

Routing may be performed by either moving the work with a stationary router or by clamping the work to the table and moving the router. Always approach the router bit from the left-hand side of the saw.

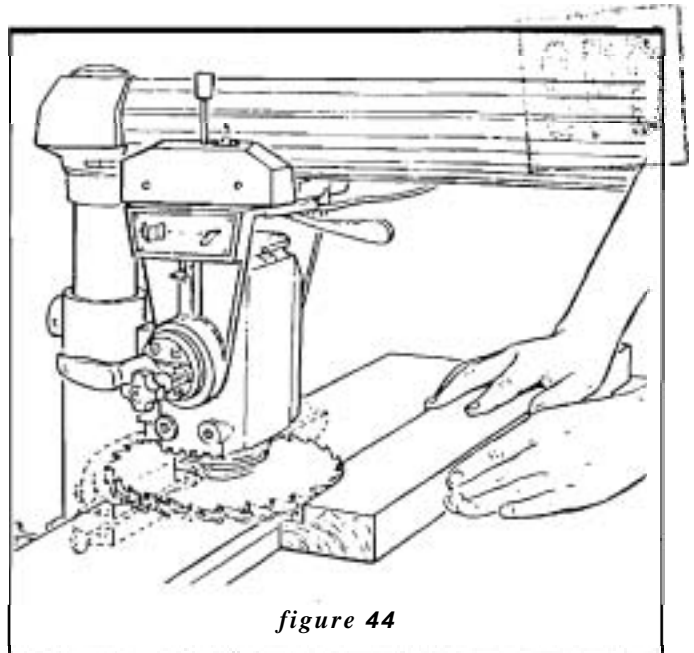


figure 44

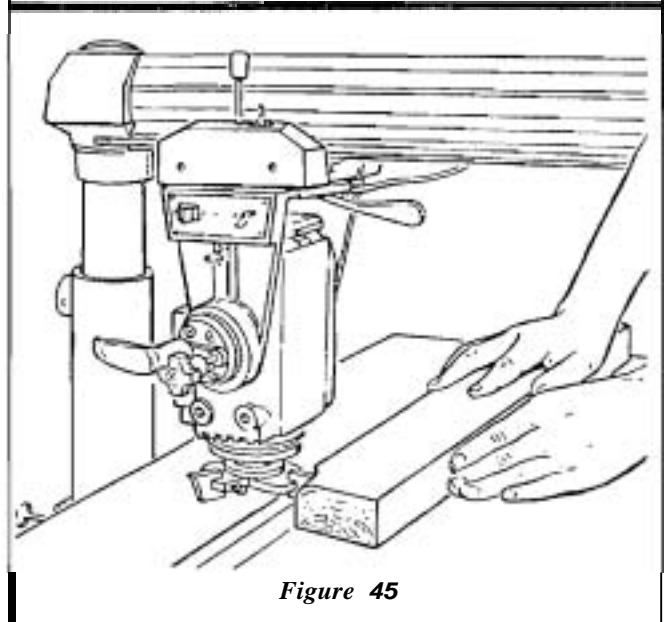


Figure 45

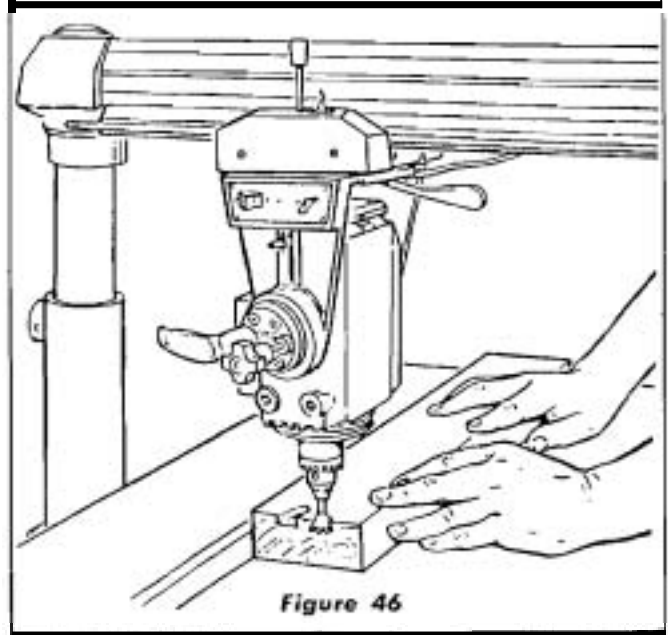


Figure 46

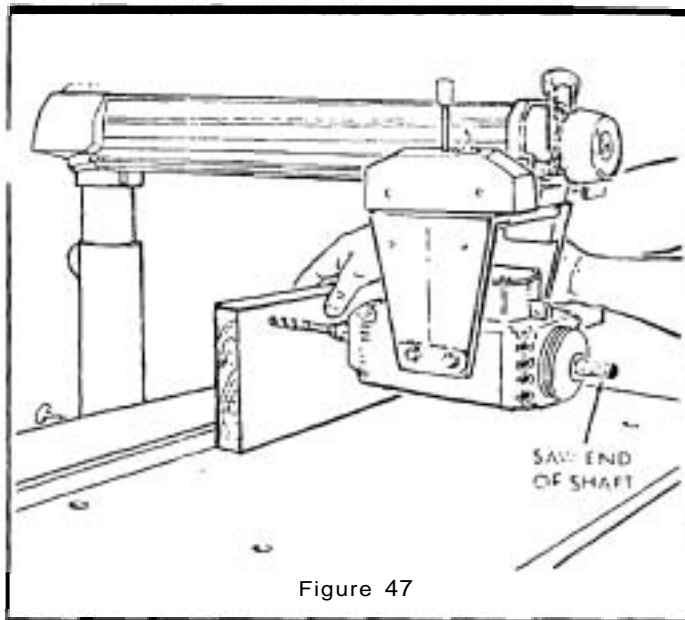


Figure 47

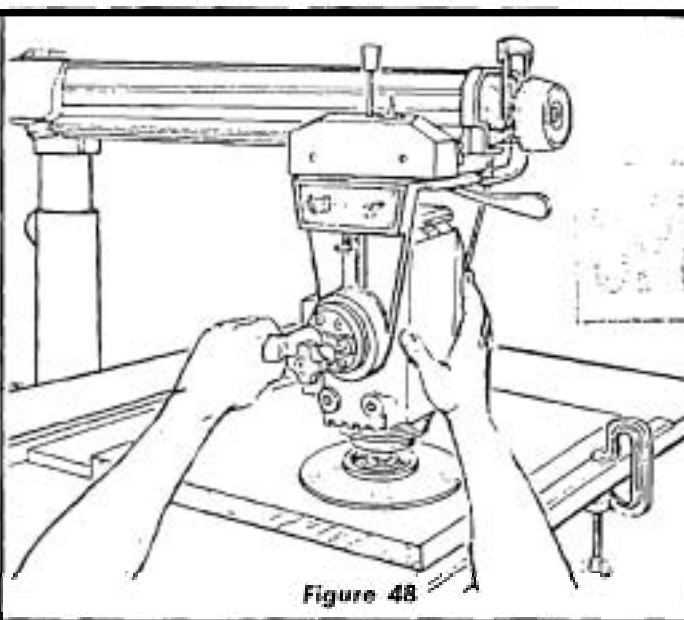


Figure 48

BORING

The saw may be converted to a horizontal drill for boring by using one of the recommended chucks and the proper drill. For drilling holes on an angle, the radial arm should be positioned to the desired angle while the work is held parallel to the fence. (See figure 47.)

SANDING

Using the 10-inch sanding disc mounted on the saw end of the motor, the saw can be converted into a sander and operated in any position. One loose collar should be used on each side of the sanding disc. (See figure 48.)

FENCE LOCATIONS

There are three positions in which the fence can be located. (See figure 49.)

1. Normal position.
2. Position used for maximum crosscut on one-inch material and for greater bevel and miter capacity.
CAUTION: Rip scales cannot be used in this position.
3. Position used for maximum out-rip capacity.

STABILIZING WASHERS FOR THIN BLADES

Stabilizing washers should be used with blades for improved appearance of the finished cuts.

BRAKE

The motor of this saw is equipped with a built-in electro-mechanical brake to eliminate a lengthy "coast" time after the saw is turned off. When the motor is started, the brake

shoe is instantly pulled away from the brake lining so the motor does not start under load. When the motor is turned off, braking action takes place automatically. This brake is designed to stop a free running saw blade in 20 to 25 seconds. **DO NOT** attempt to alter either the brake disc or the lining to obtain a faster stopping time. Stopping the blade too suddenly could possibly unscrew the shaft nut.

HELPFUL HINTS

1. The life of the laminated saw table can be greatly lengthened by tacking a piece of 1/4-inch thick plywood to the table top.
2. There is a possibility that after tacking a piece of plywood to the table top, the plywood surface may not be smooth or may be uneven. Lay a straightedge across the surface of the table and check for gaps or high spots on the table. Any portions of the table that are not flat may be sanded until flat. Sanding can be accomplished in the manner shown in figure 48.
3. When sanding on the table top, or routing with the work stationary, the arm lock pin can be prevented from automatically indexing at 0° and 45° by rotating the arm latch handle approximately six turns counter-clockwise from the locked position.
4. A scale may be provided to aid the operator when measuring lengths during cross-cut operations, by tacking or gluing a yard-stick or wood scale to the fence as shown. (See figure 50.)
5. In the event of a warped fence that cannot be straightened by tightening the table clamps, remove the fence and install a new fence cut to the same size from a piece of straight stock.

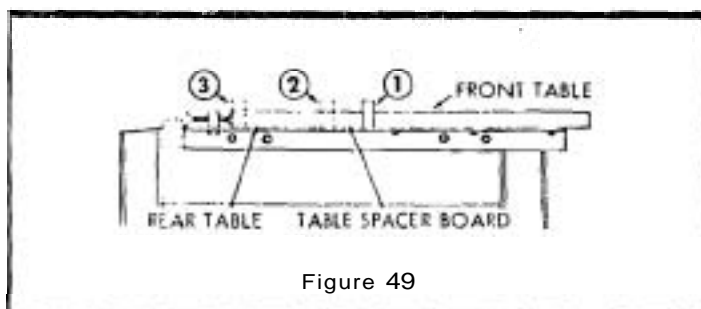


Figure 49

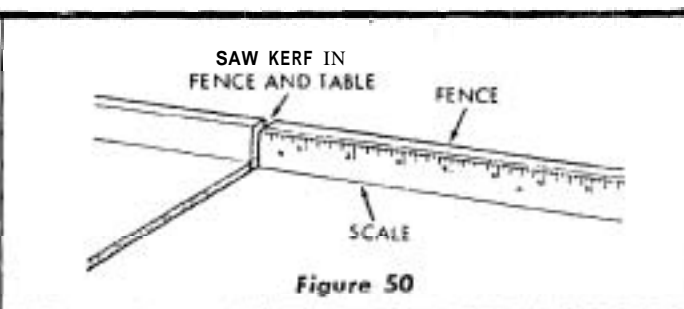


Figure 50

6. Keep all cutting tools such as saw blades, drills, molding cutters, dados, etc., sharp and do not force feed the work to the point where the motor speed is drastically reduced. This will minimize effort, provide smoother and more accurate cuts, resist overheating and possible burn out caused by abuse due to overloading.
7. When using the planer, molding, or dado blades, repeated light cuts will produce best results. Deep cuts reduce the quality of the finish.

BENCH POWER TOOL GUARANTEE

We guarantee all Craftsman Radial Saws to be free from defects in material and workmanship. When properly used, cared for and maintained, we will replace or repair at our option and install without cost to you, for a period of one (1) year from date of sale, any part which proves, upon our examinations, to be defective under normal use. This guarantee doesn't apply to Radial Saws used in rental service.

FOR PARTS LISTS

SEE PAGES 20 TO 28

FOR TROUBLE-SHOOTING CHARTS

SEE PAGES 29 AND 30

PARTS LIST

CRAFTSMAN, 12-INCH RADIAL SAW, MODEL No. 113.29501

All parts illustrated in Figures 51 through 56 and listed under part numbers may be ordered through any Sears retail store or Catalog order store. Order parts by mail from the Catalog order house which serves the territory in which you live. In several instances, part numbers are listed for COMPLETE ASSEMBLIES. All parts are shipped prepaid within the limits of the Continental United States.

WHEN ORDERING REPAIR PARTS, ALWAYS GIVE THE FOLLOWING INFORMATION AS SHOWN ON THIS LIST:

1. THE PART NUMBER
2. THE PART NAME
3. THE MODEL NUMBER 113.29501
4. THE NAME OF ITEM — RADIAL SAW

Always order by Part Number — not by Key Number

FIGURE 51 PARTS LIST

| Key No. | Part No. | Description | Key No. | Part No. | Description |
|---------|----------|--|-----------|----------|--|
| 1 | 448033 | Screw, Mach., No. 10-32 x 3/8, Type 23 C.I., Pan Hd. Slotted | 23 | 30490 | Spring, Arm Latch |
| 2 | 63098 | Plate, Cover | 24 | 63096 | Cap, Trim |
| 3 | 63097 | Cap, Radial Arm | 25 | 436753 | Screw, Mach., No. 10-32 x 3/4, Type 23 C.I., Pan Hd. |
| 4 | 115109 | *Washer, Lock 1/4 x .107 x .062 | 26 | 60076 | Washer, Plain, .505 x 1-1/8 x 1/16 |
| 5 | 226310 | *Screw, Mach., 1/4-28 x 1-3/4, Fil. Hd. | 27 | 37372 | Lever, Arm Latch |
| 6 | 37935 | Washer, Fibre .140 x .250 x 1/32 | 28 | 37373 | Washer, Spring |
| 7 | 9404351 | Screw, Mach., No. 6-32 x 5/16, Type 23 C.I., Pan Hd. | 29 | 60030 | Washer, Plain, .505 x 1 x 1/32, Steel |
| 8 | 63095 | Indicator No. 1 | 30 | 37374 | Handle |
| 9 | | Clamp, Cord | 31 | 63111 | Disc, Color (Ring) |
| 10 | 448011 | Screw, Mach., No. 8-32 x 3/8, Type 23 C.I., Pan Hd. | 32 | 60077 | Screw, Mach., 1/4-20 x 1-3/8, Truss Hd., w/L/washer |
| 11 | 30662 | Screw, Arm Lock | 33 | 63139 | Clamp, Cord |
| 12 | 30482 | Pin, Arm Lock | 34 | 63141 | Wrench, Shaft |
| 13 | 60021 | *Screw, Mach., 1/4-20 x 7/16, Hex. Hd. Ind. | 35 | 63142 | Wrench, Arbor |
| 14 | 63102 | Support Assy., Motor | 36 | 30495 | Nut, Shaft |
| 15 | 30606 | Washer, Index Handle | 37 | 30494 | Collar |
| 16 | 9421626 | *Screw, Socket Hex. Hd., Cap, 5/16-18 x 1-1/2 | 38 | 60177 | Blade, Saw, 12" |
| 17 | 37435 | *Wrench, Hex. "1", 1/4 Across Flats | 39 | 63149 | Motor Assembly (See figure 54) |
| 18 | 37861 | Key, Safety Lock | 40 | 30661 | Shoe, Brake |
| 19 | 37370 | Shaft Assembly, Latch Arm | 41 | 30479 | Latch, Arm |
| 20 | 30655 | Ring, Retaining | 42 | 9415837 | *Screw, Mach., 3/8-16 x 3/4, Hex Hd. |
| 21 | 30489 | Washer, Spring Support | 43 | 131202 | Washer, Lock, 3/8 S.A.E. Std. |
| 22 | 443151 | Pin, Groove | 44 | 63160 | Trim, Radial Arm |
| | | | Not Shown | 63161 | Operating Instructions and Parts List For Craftsman 12" Radial Arm Saw Model 113.29501 |

* Standard Hardware Item — May be Purchased Locally.

NOTE: Shipping and handling charges for standard hardware items (identified by*) such as nuts, screws, washers, etc., make buying these items by mail uneconomical. To avoid shipping and handling charges, you may obtain most of these locally.

CRAFTSMAN, 12-INCH RADIAL SAW, MODEL No. 113.29501

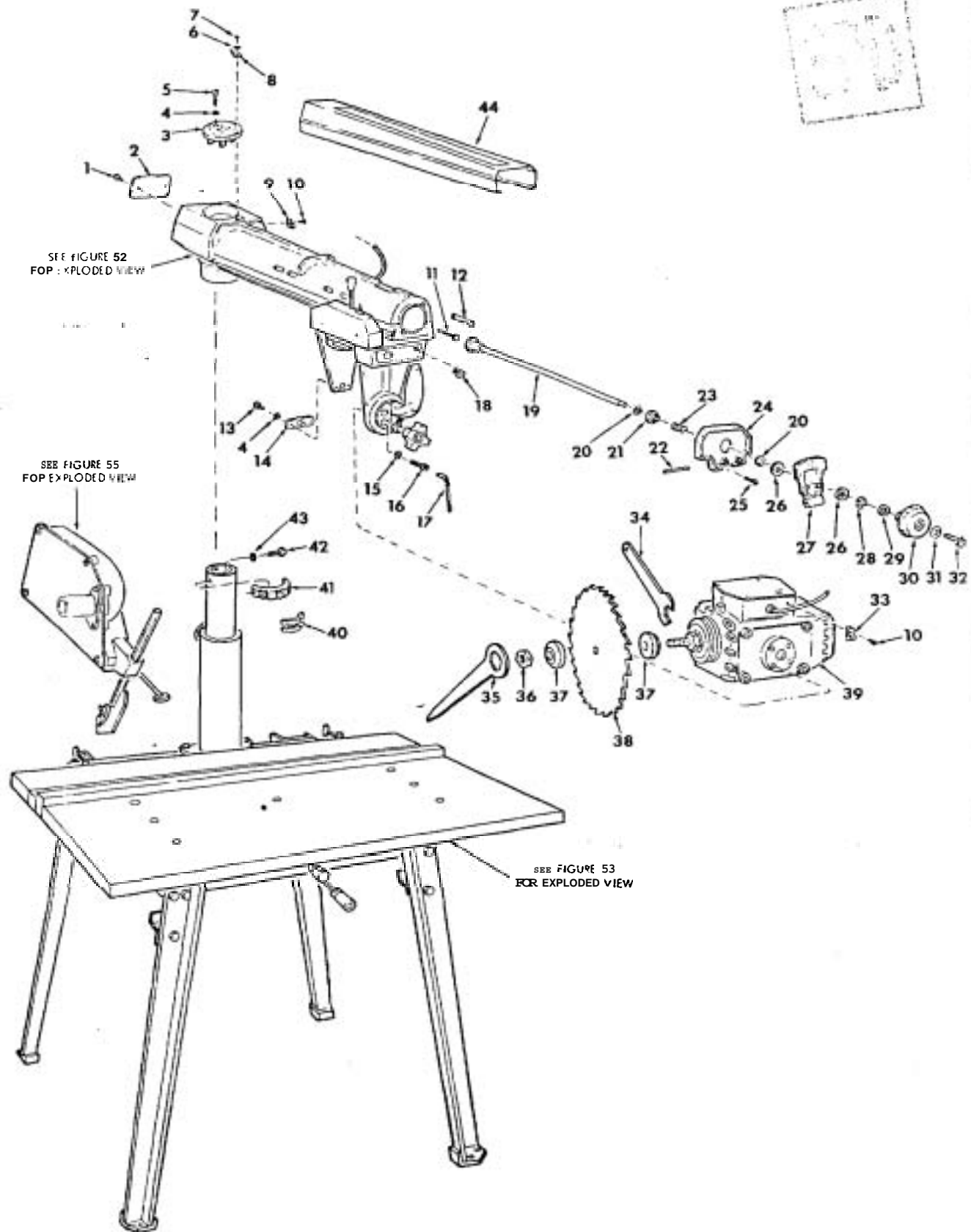


Figure 51

CRAFTSMAN, 12-INCH RADIAL SAW, MODEL No. 113.29501



FIGURE 52 PARTS LIST

| Key No. | Part No. | Description |
|---------|----------|--|
| 1 | 63126 | Arm, Radial |
| 2 | 63129 | Pin, Spring |
| 3 | 60004 | Ring, Retaining |
| 4 | 63128 | Stop, Carriage |
| 5 | 63130 | Spring, Carriage Stop |
| 6 | 436664 | *Screw, Mach., No. 6-32 x 7/16, Pan Hd., Cad. |
| 7 | 63087 | Indicator, Rip Scale |
| 8 | 63120 | Shoe, Carriage Lock |
| 9 | 63147 | Pin, Carriage Lock |
| 10 | 63099 | Cover, Carriage R.H. |
| 11 | 63101 | Knob, Carriage Lock |
| 12 | 63072 | Disc, Color (4) |
| 13 | 436751 | *Screw, Mach., No. 10-32 x 5/8, Pan Hd., Cad. |
| 14 | 30530 | Nut, Twin |
| 15 | 60088 | *Screw, Mach., 5/16-18 x 1-1/2, Hex. Hd. Ind., Steel |
| 16 | 37388 | Sleeve, Bearing |
| 17 | 37936 | Washer, Plain, .328 x 3/4 x 1/16 |
| 18 | 63117 | Bearing, Carriage |

| Key No. | Part No. | Description |
|---------|----------|--|
| 19 | 30566 | Clamp Assembly, Yoke |
| 20 | 30567 | Bumper |
| 21 | 456299 | Pin, Roll |
| 22 | 63148 | Carriage |
| 23 | 120214 | *Washer, Lock 5/16 x .125 x .078 |
| 24 | 124824 | *Nut, Hex., 5/16-18 x 1/2 x 3/16, Stl. |
| 25 | 37403 | Handle, Yoke Clamp |
| 26 | 63071 | Disc, Color (3) |
| 27 | 37816 | Washer, Flat, .630 x 1-1/8 x .093 |
| 28 | 30558 | Screw, Lock |
| 29 | 63118 | Housing, Latch Pin |
| 30 | 30565 | Bumper |
| 31 | 63100 | Cover, Carriage L.H. |
| 32 | 37494 | Pin, Swivel Latch |
| 33 | 37387 | Screw, Eccentric |
| 34 | 30521 | Spring, Swivel latch |
| 35 | 63119 | Retainer, Spring |
| 36 | 63138 | Handle, Swivel Latch Pin |
| 37 | 63127 | Track |
| 38 | 448337 | Screw, Mach., No. 10-32 x 5/8, Type 23 C.I., Rd. Hd., Cad. |

* Standard Hardware Item — May be Purchased locally.

CRAFTSMAN, 12-INCH RADIAL SAW, MODEL No. 113.29501

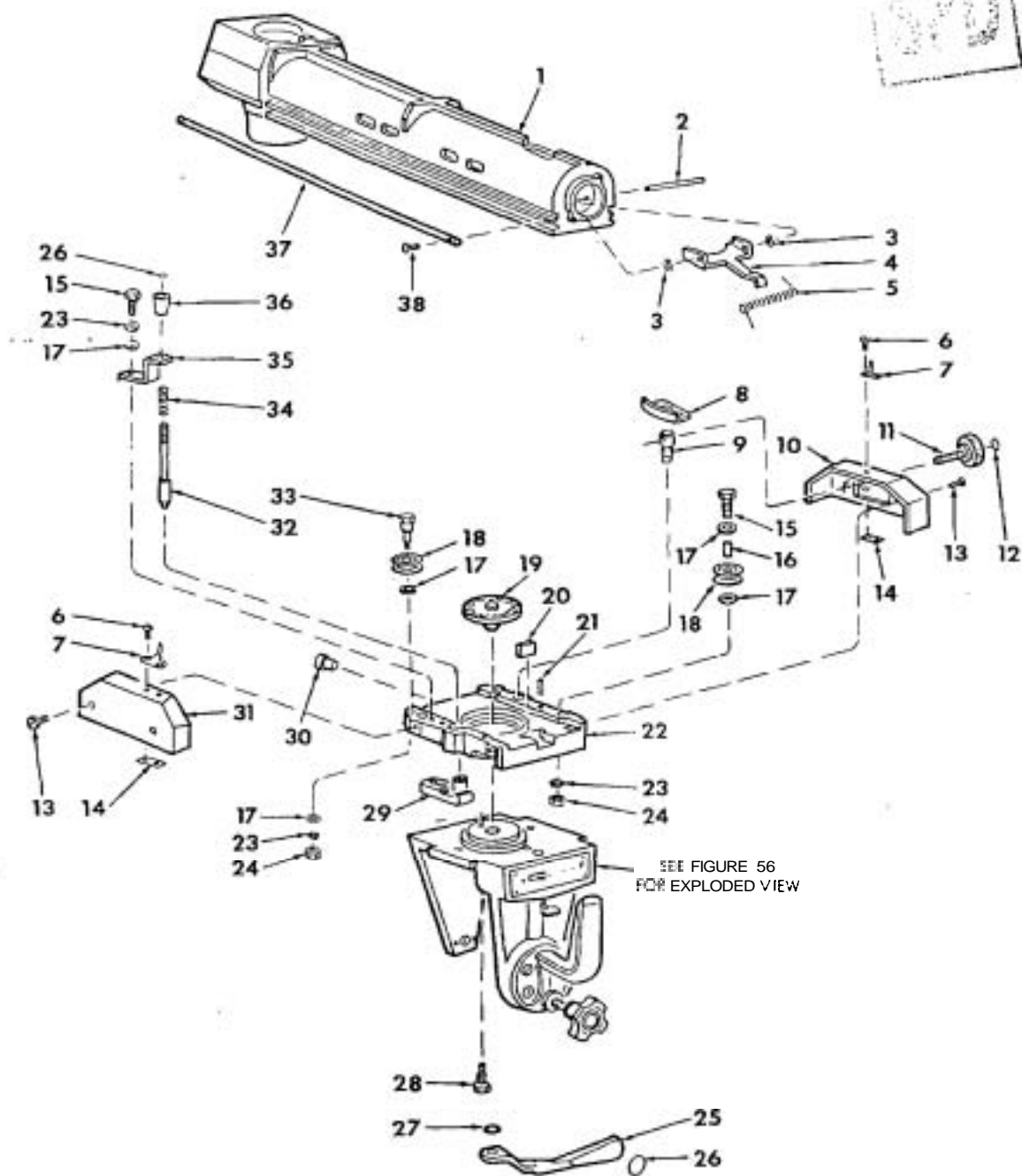


Figure 52

CRAFTSMAN, 12-INCH RADIAL SAW, MODEL No. 113.29501



FIGURE 53 PARTS LIST

| Key No. | Part No. | Description |
|---------|----------|---|
| 1 | 63146 | Tube Assembly, Column |
| 2 | 139416 | *Screw, Set, 3/8-16 x 5/8, Socket Hd., Cone Pt. |
| 3 | 63114 | Support, Column |
| 4 | 60020 | *Screw, Mach., 3/8-16 x 1-1/8, Hex. Hd. Ind. |
| 5 | 63108 | Table, Rear |
| 6 | 60056 | *Screw, Mach., 1/4-20 x 1, Pan Hd., Slotted |
| 7 | 37937 | *Washer, Plain, 17/64 x 5/8 x 1/32 |
| 8 | 63109 | Spacer, Table |
| 9 | 63110 | Fence, Rip |
| 10 | 63107 | Table, Front |
| 11 | 131202 | Washer, Lock, 3/8 SAE. Stl. |
| 12 | 60022 | *Screw, Mach., 3/8-16 x 5/8, Hex. Hd., Steel |
| 13 | 125525 | *Nut, Square, 3/8-16 x 5/8 x 21/64 |
| 14 | 63094 | Base |
| 15 | 60087 | *Washer, Plain, 13/32 x 7/8 x 1/16 |
| 16 | 9415838 | *Screw, Mach., 3/8-16 x 1, Hex. Hd. Ind. |
| 17 | 63105 | Support, Table R.H. |
| 18 | 115109 | *Washer, Lock, 1/4 x .109 x .062 |
| 19 | 115120 | *Nut, Hex., 1/4-20 x 7/16 x 3/16, Stl. |
| 20 | 118615 | *Nut, Hex., 3/8-16 x 9/16 x 21/64, Stl. |
| 21 | 120217 | *Washer, Lock, No. 10 x .062 x .047 |
| 22 | 448035 | *Screw, No. 10-32 x 1/2, Pan Hd. |
| 23 | 30505 | *Wrench, Hex. "L", 1/8 Across Flats |
| 24 | 102570 | *Screw, Set, 1/4-20 x 3/8, Socket Hd., Cup Pt. |
| 25 | 63084 | Crank Assembly, Elevation |
| 26 | 63091 | Leg |

| Key No. | Part No. | Description |
|---------|----------|--|
| 27 | 63116 | Shaft Assembly, Elevating Crank |
| 28 | 30509 | Washer, End Play, No. 8 (As Required) |
| 29 | 30510 | Bracket, Elevating Shaft Bearing |
| 30 | 448649 | Screw, Mach., 1/4-20 x 3/4, Type 23 C.I., Hex. Hd. |
| 31 | 30512 | Bracket, Bearing |
| 32 | 60079 | Washer, Plain, .203 x 7/16 x 1/16 |
| 33 | 30604 | Washer, Oil Sling |
| 34 | 30511 | Pin, Pivot |
| 35 | 63115 | Shaft Assembly, Elevation |
| 36 | 37428 | Plate, Retaining |
| 37 | 60080 | Washer, Plain, .515 x 7/8 x 1/32, Stl. |
| 38 | 30516 | Ring, Retaining |
| 39 | 423561 | *Screw, Mach., 5/16-18 x 7/8, Hex. Hd. Ind. w/L/washer |
| 40 | 63086 | Clamp |
| 41 | 63104 | Support, Table LH |
| 42 | 9415813 | *Screw, Mach., 5/16-18 x 3/4, Hex. Hd. Ind. |
| 43 | 60013 | *Washer, Plain, 11/32 x 7/8 x 1/16, Steel |
| 44 | 219463 | *Nut, Hex., 5/16-18 x 1/2 x 21/64, Stl. |
| 45 | 116120 | *Washer, Lock, 5/16 x .125 x .078 |
| 46 | 63106 | Support, #2 Table |
| 47 | 37862 | Clamp, Table |
| 48 | 37911 | *Wrench, Hex. "L", 3/16 Across Flats |
| 49 | 102718 | *Screw, Set, 5/16-18 x 1/2, Slotted, Cup Pt. |
| 50 | 63078 | Plug, Back up (Steel) |
| 51 | 63077 | Plug, Friction (Nylon) |
| 52 | 63079 | Key, Column Tube |
| 53 | 37530 | Nut, "U" Clip, 1/4-20 |

• Standard Hardware Item — May be Purchased Locally.

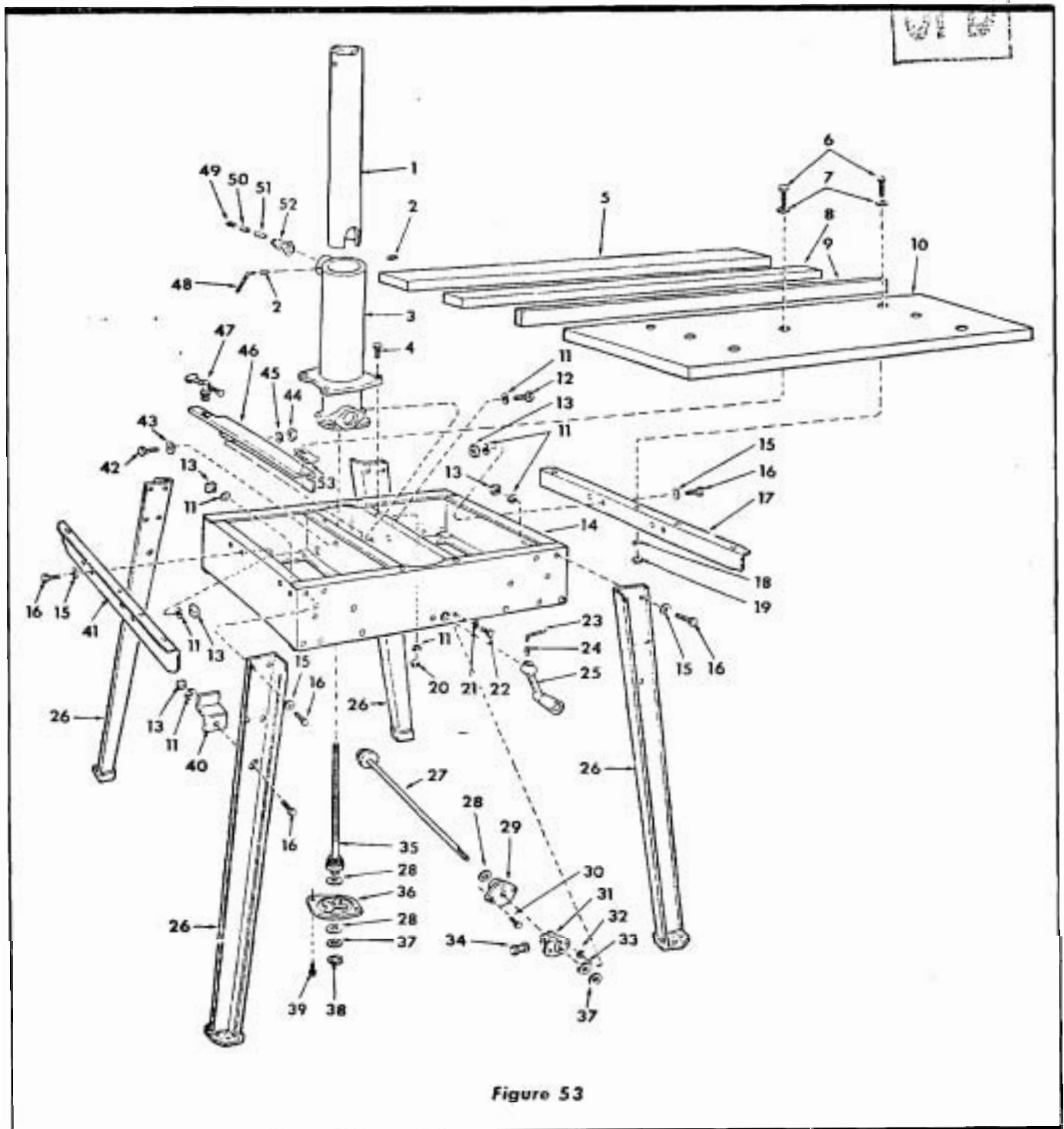


Figure 53

CRAFTSMAN, 12-INCH RADIAL SAW, MODEL No. 113.29501

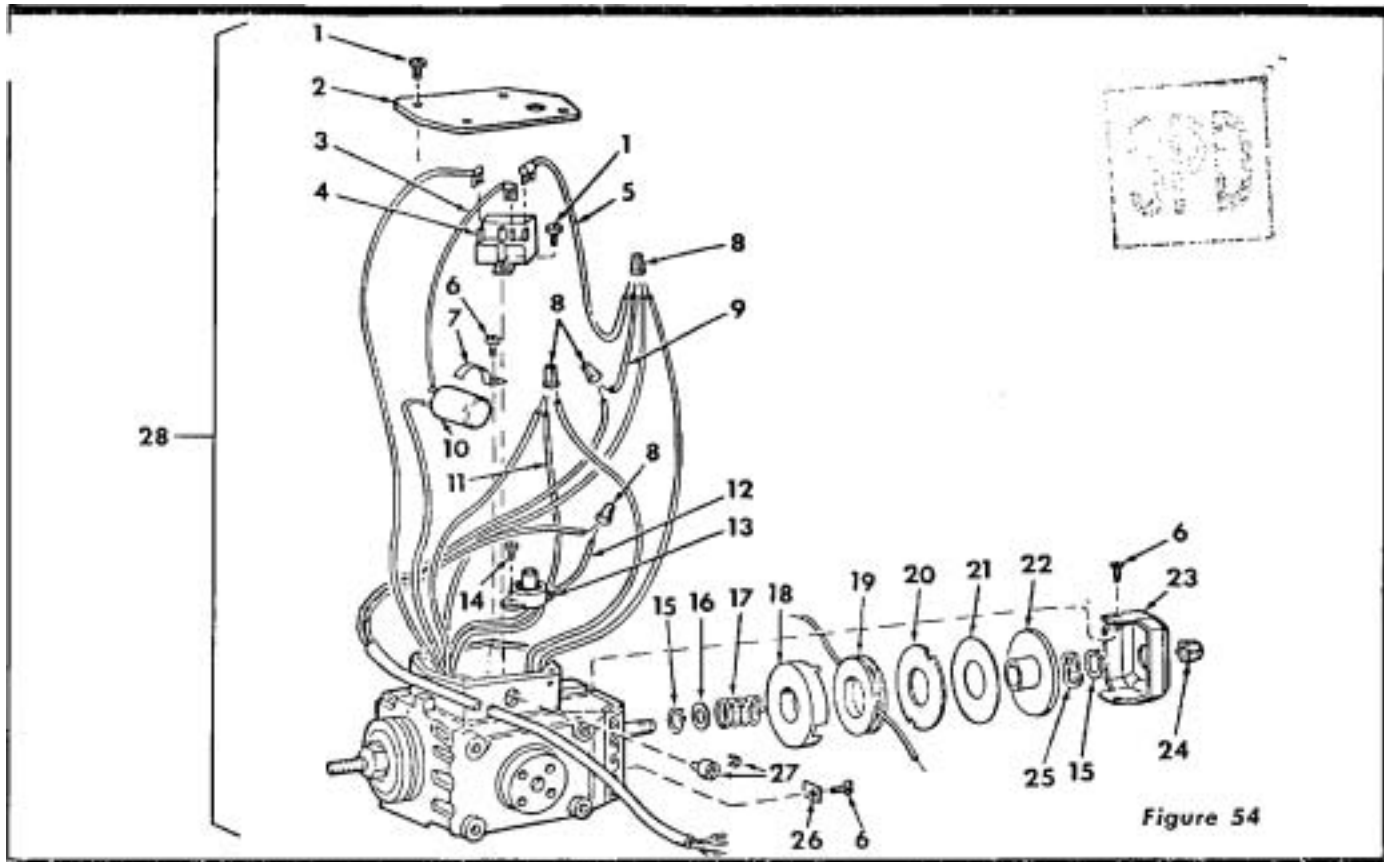


FIGURE 54 PARTS LIST

| Key No. | Part No. | Description |
|---------|----------|--|
| 1 | 448001 | Screw, No. 6-32 x 1/4, Type 23 C.I., Pan Hd., Slotted, Steel |
| 2 | 63103 | Cover and Nameplate |
| 3 | 63065 | Lead, Assembly, Block |
| 4 | 63132 | Relay |
| 5 | 37409 | Lead Assembly, Red |
| 6 | 448011 | Screw, No. 8-32 x 3/8, Type 23 C.I., Pan Hd., Slotted, Steel |
| 7 | 30700 | Clamp, Capacitor |
| 8 | 30573 | *Connector, Wire |
| 9 | 63136 | Lead, White, No. 16, 4" |
| 10 | 30586 | Capacitor |
| 11 | 63135 | Lead, Brown, No. 16, 4" |
| 12 | 63068 | Lead, Black, No. 16, 4" |
| 13 | 63131 | Protector |

| Key No. | Part No. | Description |
|---------|----------|--|
| 14 | 9404353 | Screw, No. 6-32 x 7/16, Type 23 C.I., Pan Hd., Slotted |
| 15 | 30783 | Ring, Retaining |
| 16 | 37942 | Washers, Spacer (As Required) |
| 17 | 37415 | Spring |
| 18 | 37908 | Housing, Brake Coil |
| 19 | 63133 | Coil, Brake |
| 20 | 63134 | Shoe, Brake |
| 21 | 63137 | Lining, Brake |
| 22 | 37884 | Disk, Brake |
| 23 | 63140 | Cover, Brake |
| 24 | 30582 | Cap, Shaft |
| 25 | 37886 | Washer, Spring |
| 26 | 37412 | Cleat |
| 27 | 37875 | Relief, Strain |
| 28 | 63149 | Complete motor assembly |

* Standard Hardware Item — May be Purchased Locally.

For Complete Motor Assembly Refer to Figure 51, Key No. 39, Page 21

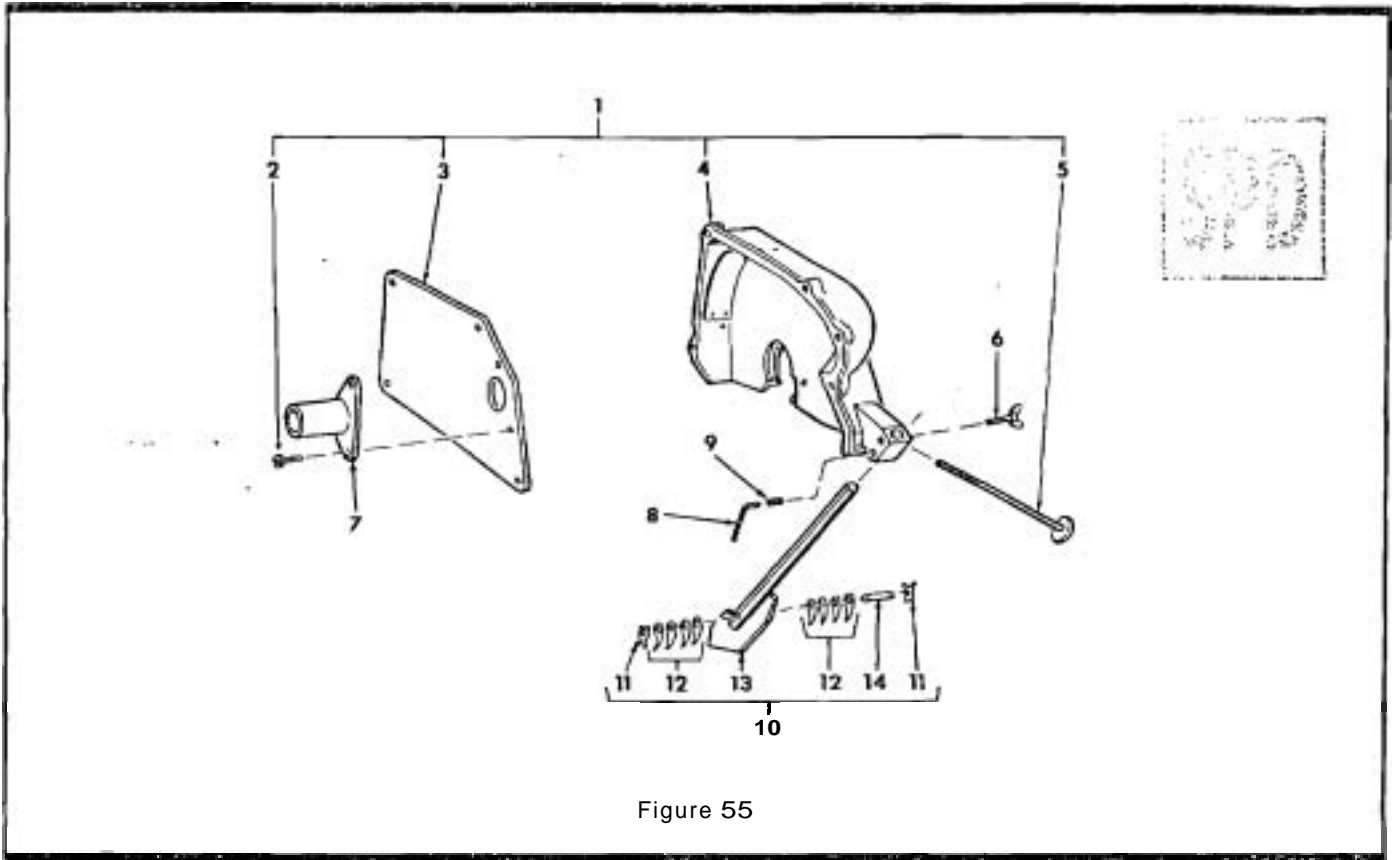


Figure 55

FIGURE 55 PARTS LIST

| Key No. | Port No. | Description |
|---------|----------|---|
| 1 | 63144 | Guard Assembly |
| 2 | 448035 | Screw, No. 10-32 x 1/2, Type 23 C.I., Pan Hd., Cad. |
| 3 | 63145 | Plate, Guard Cover |
| 4 | 63143 | Guard Assembly, Partial |
| 5 | 63039 | Screw, Guard Clamp |
| 6 | 30540 | Screw, Wing |
| 7 | 63090 | Tube, Exhaust |

| Key No. | Port No. | Description |
|---------|----------|--|
| 8 | 30505 | *Wrench, Hex. "L", 1/8 Across Flats |
| 9 | 222407 | *Screw, Set, 1/4-20 x 1/2, Hex. Socket, Flat Pt. |
| 10 | 63088 | Pawl Assembly, Anti-Kickback |
| 11 | 30542 | Washer, "X" |
| 12 | 30543 | Pawl, Anti-Kickback |
| 13 | 63150 | Rod Assembly |
| 14 | 37400 | Pin, Cross |

* Standard Hardware Item — May be Purchased Locally.

*First & Second Page of Identification
Form 3215 & 3215-1 (Right Hand page of Manual)
Do not include in the 1st page
include 1st & 2nd page
and also on the 3rd page*

27

CRAFTSMAN, 12-INCH RADIAL SAW, MODEL No. 113.29501

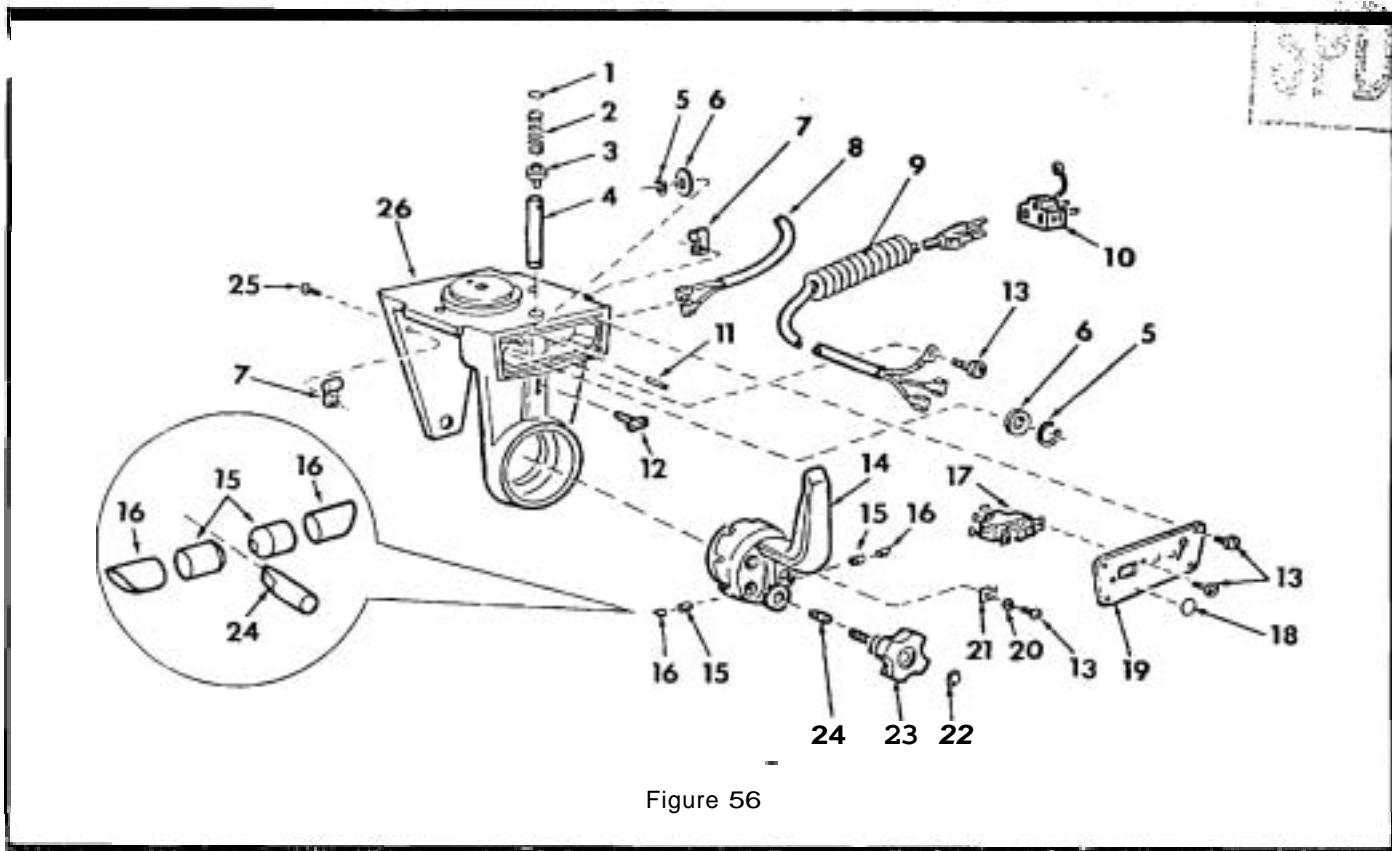


Figure 56

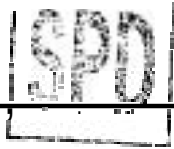
FIGURE 56 PARTS LIST

| Key No. | Part No. | Description |
|---------|----------|--|
| 1 | 30547 | Disk |
| 2 | 30548 | Spring, Latch Pin |
| 3 | 30690 | Retainer, Latch Pin Handle |
| 4 | 30689 | Pin, Bevel Latch |
| 5 | 30574 | Ring, Hog |
| 6 | 60055 | Washer, Fibre, .380 x 3/4 x 1/16 |
| 7 | 30472 | Clamp, Cord |
| 8 | 63162 | Cord, Motor |
| 9 | 63163 | Cord with Plug |
| 10 | 37568 | *Adapter, Plug |
| 11 | 453676 | Pin, Roll |
| 12 | 30693 | Handle, Latch Pin |
| 13 | 448001 | Screw, No. 6-32 x 1/4, Type 23 C.I., Pan Hd., Cad. |

| Key No. | Part No. | Description |
|---------|----------|---|
| 14 | 30556 | Handle, Bevel Index |
| 15 | 30663 | Expander |
| 16 | 30665 | Shoe, Index Handle Brake |
| 17 | 63048 | Switch (off-on) |
| 18 | 63075 | Disc, Color (6) |
| 19 | 63124 | Lock Assembly, Switch |
| 20 | 37935 | Washer, Fibre, .140 x .250 x 1/32 |
| 21 | 30559 | Indicator, No. 2 |
| 22 | 63073 | Disc, Color (5) |
| 23 | 63123 | Knob, Bevel Index |
| 24 | 30664 | Pad, Pressure |
| 25 | 145205 | Screw, Sheet Metal, No. 8 x 3/4, Type B, Pan Hd., Steel |
| 26 | 63121 | Yoke Assembly |

* Standard Hardware Item — May be Purchased Locally.

TROUBLE SHOOTING CHART — GENERAL



| TROUBLE | PROBABLE CAUSE | REMEDY |
|--|--|--|
| Blade "heels" to right or left. | 1. Heel has not been taken out of blade. | 1. Refer to "STEP SIX — CHECKING THE SAW BLADE FOR HEEL (Left and Right)." |
| Cannot "rip" properly, wood smokes and motor stops. | 1. Dull blade. 2. Crosscut and rip fence are not squared. 3. Radial arm not locked in 0° position. 4. Blade not squared to the table top. | 1. Check sharpness of blade or warped board. Refer to the paragraph entitled "RIPPING." Ripping with hollow-ground blades when boards are badly warped is very difficult. 2. Refer to "STEP THREE — SQUARING THE CROSS-CUT." 3. Make sure the radial arm is locked and indexed properly in the 0° degree position. 4. Refer to "STEP FIVE — SQUARING THE SAW BLADE TO THE TABLE TOP." |
| Elevation crank operates roughly; chatter exists. | Column tube key not adjusted properly. | Check adjustment of key plug. Refer to "STEP TWO — CHECKING FOR LOOSENESS OF COLUMN TUBE IN COLUMN SUPPORT." |
| Motor will not run. | 1. Protector open; circuit broken. 2. Low voltage. | 1. Reset protector by pushing on red button, located on top of motor junction box (indicated by audible click). 2. Check power line for proper voltage. |
| Motor will not run and fuses "BLOW." | 1. Short circuit in line cord or plug. 2. Short circuit in junction box, or loose connections. | 1. Inspect line cord and plug for damaged insulation and shorted wires. 2. Inspect all terminals in motor junction box for loose or shorted terminals. |
| Blade does not maintain constant depth of cut across table. | 1. Plane of table top not parallel to horizontal plane through radial arm. 2. Table badly warped. | 1. Table is not aligned with radial arm. Refer to "STEP FOUR — ADJUSTING THE TABLE PARALLEL TO RADIAL ARM." 2. Replace table top. |
| Blade does not cut square, or repeat cuts cannot be secured. | 1. Excessive free play in column tube key adjustment. 2. Excessive free play in radial arm. 3. Cross-cut travel and rip fence are not squared. 4. Improper movement of arm for miter cuts. 5. Saw blade not square to the table top. 6. Bearings loose on track. 7. Yoke does not index properly. 8. Yoke clamp does not tighten yoke; or looseness is felt in yoke assembly. | 1. Refer to "STEP TWO — CHECKING FOR LOOSENESS OF COLUMN TUBE IN COLUMN SUPPORT." 2. Remove radial arm cap and check the two 3/8-inch screws for tightness. 3. Refer to "STEP THREE — SQUARING THE CROSS-CUT." 4. Before moving the radial arm to the desired miter index position, mainly 0° and 45° positions, make sure the arm latch handle is rotated just 1/4th. It may be advisable to push on the arm latch lever solidly with the palm of the hand to insure proper indexing at 0° and 45° positions. Refer to the paragraph entitled "ANGULAR MOVEMENT AND LOCKING OF RADIAL ARM." 5. Refer to "STEP FIVE — SQUARING THE SAW BLADE TO THE TABLE TOP." 6. Refer to paragraph entitled "CARRIAGE BEARING ADJUSTMENT," under "ADJUSTMENTS TO COMPENSATE FOR WEAR." 7. Check to see that yoke does index properly and/or swivel latch pin moves irregularly. If bolts on swivel latch pin housing are loose, tighten them after observing "STEP SIX — CHECKING THE SAW BLADE FOR HEEL." 8. Refer to paragraph entitled "YOKE CLAMP HANDLE ADJUSTMENT" under "ADJUSTMENTS TO COMPENSATE FOR WEAR." |

TROUBLE SHOOTING CHART – MOTOR

NOTE: Motors used on wood-working tools are particularly susceptible to the accumulation of sawdust and wood chips and should be blown out or "vacuumed" frequently to prevent interference with normal motor ventilation.

| TROUBLE | PROBABLE CAUSE | REMEDY |
|--|--|---|
| Motor will not run. | <ol style="list-style-type: none"> 1. Protector open; circuit broken. 2. Low voltage. | <ol style="list-style-type: none"> 1. Reset protector by pushing on red button, located on top of motor junction box (indicated by audible click). 2. Check power line for proper voltage. |
| Motor will not run and fuses "BLOW." | <ol style="list-style-type: none"> 1. Short circuit in line cord or plug. 2. Short circuit in junction box, or loose connections. | <ol style="list-style-type: none"> 1. Inspect line cord and plug for damaged insulation and shorted wires. 2. Inspect all terminals in motor junction box for loose or shorted terminals. |
| Motor fails to develop full power. (Power output of motor decreases rapidly with decrease in voltage at motor terminals. For example: a reduction of 10% in voltage causes a reduction of 19% in maximum power output of which the motor is capable, while a reduction of 20% in voltage causes a reduction of 36% in maximum power output.) | <ol style="list-style-type: none"> 1. Power line overloaded with lights, appliances and other motors. 2. Undersize wires or circuit too long. 3. General overloading of power company's facilities. (In many sections of the country, demand for electrical power exceeds the capacity of existing generating and distribution systems.) 4. Incorrect fuses in power line. | <ol style="list-style-type: none"> 1. Reduce line load. 2. Increase wire sizes, or reduce length of wiring. 3. Request a voltage check from the power company. 4. Install correct fuses. |
| Motor start slowly or fails to come up to full speed. | <ol style="list-style-type: none"> 1. Low Voltage -- will not trip relay. 2. Starting relay not operating. | <ol style="list-style-type: none"> 1. Correct low voltage condition. 2. Replace relay. |
| Motor overheats. | <ol style="list-style-type: none"> 1. Motor overloaded. 2. Improper cooling. (Air circulation restricted through motor due to sawdust, etc.) | <ol style="list-style-type: none"> 1. Correct overload condition. 2. Clean out sawdust to provide normal air circulation through motor. |
| Starting relay in motor will not operate. | <ol style="list-style-type: none"> 1. Burned relay contacts (due to extended hold-in periods caused by low line voltage, etc.) 2. Open relay coil. 3. Loose or broken connections in motor terminal box. | <ol style="list-style-type: none"> 1. Replace relay and check line voltage. 2. Replace relay. 3. Check and repair wiring. |
| Motor stalls (resulting in blown fuses or tripped circuit breakers). | <ol style="list-style-type: none"> 1. Starting relay not operating. 2. Voltage too low to permit motor to reach operating speed. 3. Fuses or circuit breakers do not have sufficient capacity. | <ol style="list-style-type: none"> 1. Replace relay. 2. Correct the low line voltage condition. 3. Replace fuses or circuit breakers with proper capacity units. |
| Frequent opening of fuses or circuit breakers. | <ol style="list-style-type: none"> 1. Motor overloaded. 2. Fuses or circuit breakers do not have sufficient capacity. 3. Starting relay not operating (motor does not reach normal speed.) | <ol style="list-style-type: none"> 1. Reduce motor load. 2. Replace fuses or circuit breakers. 3. Replace relay. |
| Brake fails to work. | <ol style="list-style-type: none"> 1. Brake assembly "hums" excessively or "chatters." 2. Failure of brake coil (short circuit or "open"). | <ol style="list-style-type: none"> 1. Replace the brake coil. 2. <ol style="list-style-type: none"> a. Check for foreign particles between the brake shoe inside diameter and shoulder of brake disk. b. Check for 0.020-inch clearance between brake shoe and brake disk. (Clearance is probably less than 0.020-inch.) |



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